PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Vol. 116, No. 6 Thursday, February 11, 1943 Price Ten Cents

Newsprint Cut Under WPB Consideration

Director of Pulp and Paper Division Confirms Reports of Impending Reduction in Use of Newsprint Paper—No Change Contemplated Before March 31—House Republicans May Start Inquiry.

WASHINGTON, D. C., February 8, 1943—Another cut in the available supply of newsprint was confirmed by the War Production Board today. Assurances were given that no such order would be issued before March 31, if then.

This assurance came from Arthur G. Wakeman, director of the Pulp and Paper Division of the War Production Board, following a conference of forty Republican members of the House, at which meeting Representative Bradley of Michigan declared that a further reduction in the use of newsprint would menace the press.

Representative Bradley said he had been "reliably informed" of a contemplated 10% reduction, besides the 10% reduction resulting from a WPB order of December 31, which limited newspapers during 1943 to their 1941 tonnages of newsprint plus a 3% spoilage allowance.

"This is the first step in setting up a dictatorship," he told reporters after the conference. "These bureaucrats are trying to set up a collective state in this government so that the people will read and hear only what they want them to read and hear."

Sees Danger To Smaller Newspaper

Representative Bradley said he was not accusing President Roosevelt of dictatorial ambitions, but contended that the foundation of a collective state would be laid by further reduction of newsprint usage, whether or not that was the object. He said newspapers of 3,000 to 15,000 circulation would be forced out of business and larger papers would lose a major part of their "bread and butter" — advertising — through space limitations.

Representative Shafer of Michigan, told the conference that "a precipitous cut," probably as high as 50%, was planned and said that "this would mean the elimination of practically every newspaper in the country with a circulation of 15,000 to 20,000 or over." He said the proposed cut was part of "an insidious movement by long-haired theorists to destroy the press," and was opposed by conservative officials of the WPB.

While Mr. Shafer did not give the basis of his fears of a 50% reduction, it was learned that the WPB's Office of Civilian Supply, in its recent outline of what a "bedrock" war economy would require, if established, estimated that newspapers could get along on 40% of the newsprint they used in 1939 in terms of dollar values.

Supports Investigation Resolution

Representative Bradley said he called the conference of House members from paper producing areas to organize support of a resolution introduced last week by Representative Shafer calling for an investigation of "the general confusion caused by rationing, regimentation, standardization, etc.," particularly in regard to the paper industry, and to seek postponement of further newsprint slashes until such an investigation has been completed.

The WPB's assurance that no other cut would be made before March 31 was given to Representative Lea of California, chairman of the House Interstate and Foreign Commerce Committee, to which the Shafer resolution had been referred.

Mr. Lea said he was satisfied that an investigation by his committee, if found to be justified, could be completed before March 31. Representative Bradley agreed, but said he and Representative Shafer would meet tomorrow with WPB officials to look into the matter further and make doubly sure that no reduction would be ordered in the meantime.

Mr. Lea was also assured by WPB spokesmen that any further newsprint reduction would follow consultation with the industry and that adequate notice would be given. He was told that the pulp and paper division was meeting with representatives of labor tomorrow on the question.

Donald Nelson, WPB chairman, met with other WPB officials this afternoon to consider the matters brought up at this morning's Congressional conference, but no information as to decisions reached was made public.

Manpower Situation Confused

Another development discussed at the Congressional conference was a recent intimation by the Of-

(Continued on page 39)

Wisconsin Leads in Private Reforestation

Operations of Three Paper Mills in Past Year Places State First in Acres Replanted By Industrial Organizations — Recommends Use of Lignin to Produce Alcohol — Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., February 8, 1943 — Wisconsin ranks first among all states in acres reforested by industrial organizations as the result of operations by three paper mills during the last year, according to a report issued by F. G. Wilson, superintendent of the cooperative forestry division of the Wisconsin Conservation Commission.

Privately-owned land entered under the forest crop law totals 150,013 acres, a slight increase over 1941. More than two-thirds of this acreage is held by the three paper mills and one lumber company practicing selective logging. The mills are the Nekoosa-Edwards Paper Company, Port Edwards, Wis., the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., and the Tomahawk Kraft Paper Company, Tomahawk, Wis.

County maintained forests in Wisconsin now total 1,884,035 acres, according to the Wilson report. Last year a total of 10,625,000 trees were planted on 9,673 acres by 25 counties, the lowest since 1937 due to labor shortage. These forests yielded 18,552 cords of pulpwood during the fiscal year ended June 30, 1942, under a strict selective cutting program. The forests also yielded 1,506,000 board feet of saw logs.

Would Use Lignin to Make Alcohol

Use of approximately a million tons of lignin dumped annually with waste sulphite liquor from paper mills is proposed by L. J. Markwardt, a scientist of the United States Forest Products Laboratory, Madison, Wis. He believes the product can be used to manufacture the alcohol used in synthetic rubber production.

This idea holds tremendous possibilities for a nation at war, Mr. Markwardt told an audience at Chicago Thursday night of last week, the members of the American Society for Testing Materials. An entire new industry could be based on lignin, he said, pointing out that in addition to the paper mill waste, there are more than 15,000,000 tons contained in the waste wood in logging and sawmill operations. "Lignin has been considered the ugly duckling among wood components," he remarked. Subjected to extreme pressure and heat, it will yield immense quantities of wood alcohol and four other chemical compounds.

Marathon Celebrates Safety Record

Two departments of the Menasha Products division of the Marathon Paper Mills Company, Menasha, Wis., held a celebration January 27 marking the completion of another year without a lost-time accident. The electrotype department, where 30 different types of machines are used, has a record of 1,410 days of 100 per cent safety. The refinery department has had no accident for 1,915 days, 90 days over five years. The celebration was held at Eagles hall at Menasha, and the workers were complimented on their records by Howard Aderhold of the personnel department. Safety movies were shown by W. A. Wamser, safety engineer of the Employers Mutuals, Wausau, Wis. Several shorts on the war were also shown.

E. A. Meyer Reelected President

E. A. Meyer was reelected president and general manager of the Badger Paper Mills, Inc., Peshtigo, Wis., at the annual meeting recently. Other officers were reelected as follows: J. P. Pulliam, Milwaukee, chairman of the board; Clarence W. Hoeper, and H. L. Haslanger, vice-presidents, and J. W. D. Leginger, Milwaukee, Wis., secretary-treasurer. Two other directors reelected by the stockholders are F. J. Lauerman, Marinette, Wis., and J. B. Angle, Milwaukee.

Mr. Meyer also was reelected chairman of the board of the Peshtigo State Bank at its recent annual meeting.

Thilmany Credit Union Reports

The Thilmany Credit Union of the Thilmany Pulp and Paper Company Kaukauna, Wis., issued $17,424.60 in war bonds and stamps during the month of January. Since becoming issuing agents last March, the union has distributed $137,949.60 in bonds.

Sales Staff of Kimberly-Clark Meet

Members of all sections of the general sales department of the Kimberly-Clark Corporation, 70 in number, attended a four-day session at the company's offices at Neenah, Wis., last week. Last year's record was reviewed and sales programs for 1943 were outlined.

Employee Honored for Long Service

When he completed fifty years of service with Kimberly-Clark Corporation on January 30, Ernest Jennerjahn was presented with a gold watch at a gathering at the mill clubhouse at Kimberly, Wis. The presentation was made by S. F. Shattuck, vice-president. A group of executives presented him with a miniature super calender roll, and his fellow workers gave him a chair.

Freeman Nichols acted as master of ceremonies, and the gathering was attended by a number of others who had long service records. Congratulatory remarks were also made by: Ernst Mahler, executive vice-president; H. G. Boon, general superintendent; Jack Limpert, Neenah, Wis., office; Fred Kranhold, assistant general superintendent, also a 50-year man; J. T. Doerfler, mill manager at Kimberly; Ray Haase, union president; Al Wilkinson, Kimberly mill superintendent, and William Kellett, C. W. Nelson and Otto Hanneman.

Mr. Jennerjahn started work with the company January 30, 1893, as a third hand on paper machines. He has been a roll grinder for 35 years.

Chicago Reports Demand Is Still High

Active Buying of Paper Has Increased Backlog Orders and Deliveries are Six to Eight Weeks Behind—Manpower and Transportation Cause Concern—More Water Shipments Now Recommended.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., February 8, 1943—Slight easing of the general paper curtailment set-up failed to any extent to counteract the heavy demand in the local paper markets. Designed to halt a "run away market," the news from the government agencies failed to satisfy eager buyers who have now combined to put the general market on the average of from six to eight weeks behind as far as orders are concerned.

There is a growing tendency to report additional worries from home offices and mills with reference to the manpower shortage situation and adequate explanation of the "essential" quality of the paper industry is reported as needed to forego a grave labor situation which might conceivably handicap certain mills long after the termination of the war. The transportation problem is also giving local paper executives much concern.

Hopes of changes in the paper board restrictions even beyond what have now been received have tended to aid the sentiment in the local board market. Krafts are continuing very strong while books and covers are reporting a continued piling up of the order back log. Groundwoods and newsprints were in the same category while bad weather was combining with other factors to slow the collection of waste paper and to tighten the market still further.

Shortage Problem Provokes Suggestions

Factors which are curbing the production of civilian supplies and which can be concentrated upon without any interference with the war effort are topics of conversation and discussion in this area. The absence of cost-plus provisions in the price ceilings confronting the paper industry is taken as a reason for some lack of civilian goods production. While makers of war materials are freed of any such ceilings, the March prices without consideration of the raw commodity and labor "freezes" which came months later, are construed as preventatives of production and essential reasons for continued shortages in civilian goods supply wherever certain types of raw materials are available. There is also the belief that both the goods and man power shortages might be materially lightened if more study was given to the general increase in work from 40 to 48 hours, with attention given to the elimination of overtime rates as inflationary and as bars to full speed production of available supplies. While these factors, plus the general "inattention" to civilian goods supply, have a general retarding influence on all business not directly producing war goods, the paper industry here has indicated a belief that these problems also have a direct application to the paper industry.

Jobbers Pass Tax Refund Along

Paper merchants who will receive a refund from the State of Illinois because of the recent favorable outcome of an Illinois Supreme Court decision with reference to their liability as payers of the Retailers Occupation Tax, are required, under recent amendments to the Act, to in turn reimburse their customers who originally paid the tax as an "added expense." Two years ago the General Assembly amended the Act to provide that no refunds would be allowed unless the original "taxpayer" were given the refund. The action was based on the State's announced desire to prevent any "windfalls" through the receipts of refunds of monies not actually and originally paid by the party liable to the State. The decision came as the result of a contention of the jobbers that printed material designed for others and on special order did not come under the provisions of the Retailers Occupation Tax Act. It is reported that twenty-eight Chicago paper jobbers who acted together in bringing the suit will share in the refund which will ultimately benefit the customers of these firms after litigation costs are deducted.

Urge More Waterway Transportation

A considerable part of the paper industry here which is interested in the use of the Great Lakes and the waterway system as a vitally important transportation adjunct, attended the annual convention of the Great Lakes Harbors Association held in Chicago this week. H. C. Brockel, municipal port official of Milwaukee, declared that the ports were not sharing in the war boom except for movements of iron ore. He indicated that if the war is extended many important lake terminal facilities may find survival difficult. D. W. Hoan, former mayor of Milwaukee, stated that the war had proved railroad facilities inadequate and he urged further development of the nation's waterways transportation facilities. He stated his belief that "such development was important for the carrying of materials to the industries of the Middle West" and added his protest of any increase in the diversion of water from Lake Michigan into the Chicago drainage canal.

To Discuss Newsprint Problems Here

M. G. Sullivan, newly-appointed newspaper consultant under W. G. Chandler in the printing and publishing division of the WPB, is to speak on newsprint problems at the February 16 meetings of the Inland Daily Press Association to be held in Chicago. Mr. Sullivan is also circulation manager of the Gannett newspapers and what he has to say concerning curtailment of newsprint pulp, rationing, et cetera, will be closely followed.

"Stick To Your Friends", R. C. Swan Urges

New business is just about "out for the duration" according to R. C. Swan, Chicago sales representative of the Champion Paper and Fibre Company. Mr. Swan made this statement at a recent meeting of the Chicago Purchasing Agents Association. The Champion sales executive added the comment that now was the time for buyers to continue their connections with sources of supply which knew their demands and who were following a policy of aiding regular customers whenever and wherever possible.

Instrumentation Studies XLII*

Measurement of the Tensile Strength of Paper

Part III: The Amthor Universal Tensile Strength Tester

By the Staff of The Institute of Paper Chemistry

Abstract

The Amthor universal tensile strength tester is described. The calibration of one presumably typical instrument was studied; the greatest error found by dead-weight loading was 0.54%, but measurements of the smale divisions indicate errors up to about 0.7% of full-scale load. This error is not serious in most applications of the instrument. It appears that the errors in the calibration are due to inaccurate division of the scale and therefore are matters that can be taken care of by the manufacturers.

* This report is one of a series issued as a part of the instrumentation program of the American Paper and Pulp Association.

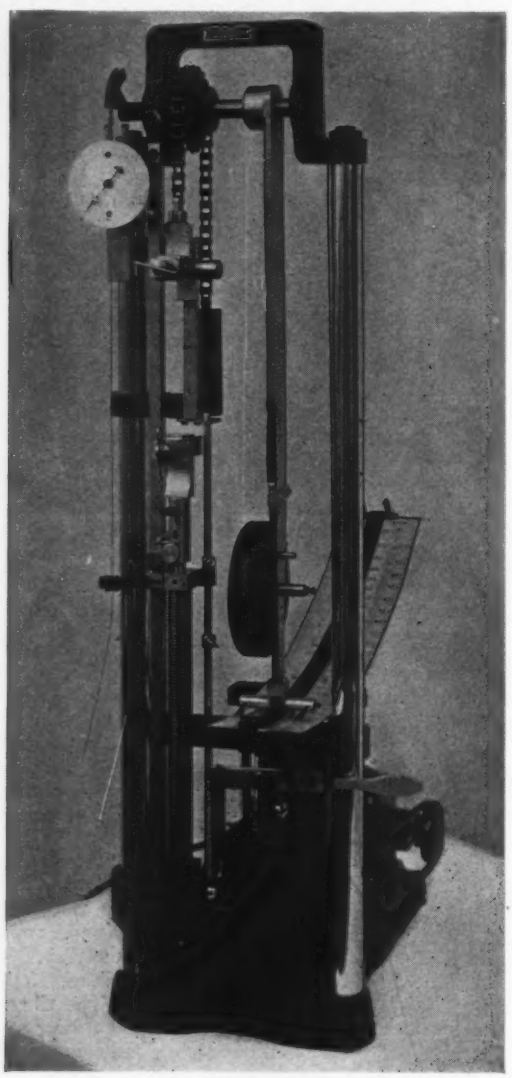


FIG. 1
Amthor Tensile Tester

The Amthor Testing Instrument Company of Brooklyn, New York, manufactures several models of tensile testers. These instruments may be obtained in a number of different ranges and subranges with scales calibrated to order. This report describes an investigation of an instrument of 200 pounds capacity.

Part I of this series (Instrumentation Studies XL (*1*)) contains a general discussion of the tensile strength testing of paper; this part deals only with the characteristics of this particular instrument. Although the instrument is equipped with an elongation scale, this feature of the instrument will not be discussed until a more thorough investigation of the general subject of stretch measurement has been made.

Description of the Instrument

A photograph of the instrument is shown in Fig. 1. The instrument is of the pendulum type and has three ranges: 0 to 200 pounds, 0 to 50 pounds, and 0 to 15 pounds with scales graduated in pounds, quarter pounds, and tenth pounds, respectively. The ranges are changed by changing the weights on the pendulum. The three scales are marked on a quadrant concentric with the axis of the pendulum, and the load is indicated by a pointer fastened to the pendulum which moves over the scale. The upper specimen clamp is connected by means of a chain to a sprocket on the shaft which supports the pendulum. The lower specimen clamp is connected to a threaded rod, called a spindle, which is motor driven through a belt, clutch, and gear box. In this particular instrument, the lower clamp is driven at a constant speed of 12 inches per minute. The jaws of the clamp are one inch wide. The complete instrument, including the motor, is mounted upon a common base.

As may be seen from Fig. 1, the pendulum swings in a plane perpendicular to the front of the instrument. When a specimen breaks, the pendulum is held at its position of maximum displacement by pawls which engage teeth on the quadrant which also bears the scales. The lower jaw is brought back to its starting position by moving the operating lever to its upper position. This starting position may be set at any desired point by adjustment of the stop on the rod which controls the clutch. For specimen lengths less than six inches the upper clamp must be lowered by shifting its chain on the sprocket.

The spindle projects below the level and in front of the base during part of its motion, so that the instrument must be set with its base flush with the edge of the table. Two screws are provided at the back of the instrument base to permit levelling the

TABLE I.—CALIBRATION OF THE INSTRUMENT

Scale	Applied Load lb.	Scale Reading lb.
0-15 lb.	1.37	1.38
	9.28	9.33
	13.23	13.26
0-50 lb.	9.0	9.0
	24.8	24.9
	40.7	40.7
0-200 lb.	40.7	40.9
	52.9	52.9
	61.0	61.2

instrument in the plane in which the pendulum swings.

The instrument is equipped with a device for indicating the elongation of the specimen. The dial of this device bears two scales, one giving the elongation in inches, the other giving the stretch in percentage for a six-inch specimen.

Calibration of the Instrument

The instrument was levelled and the zero adjustment was made in the following fashion: the pawls were held in a neutral position by wedging with a folded piece of paper. The auxiliary weights appropriate for the scale to be tested were mounted on the pendulum, and the pendulum was allowed to come to its equilibrium position while the instrument was tapped to eliminate any effects of friction. The pointer was adjusted to a position over the zero of the appropriate scale. If the chain which supports the upper clamp is moved on the sprocket to accommodate short specimens, the zero for the 50-pound scale must be adjusted when the range is changed from 200 pounds and vice versa. If the chain is in its normal position, no adjustment of the zero need be made when the scale is changed.

The calibration of each scale was then examined by noting the scale readings corresponding to various dead-weight loads applied to the upper clamp. With the pawls arrested, the scale readings corresponding to the known weights were obtained by allowing the pendulum to come to its equilibrium position while the instrument was tapped to eliminate any effects of friction. Table I lists the scale readings corresponding to the various dead-weight loads applied to the instrument. The calibration of the instrument appeared satisfactory.

It was noted that near the tops of the 50- and 200-pound scales some of the divisions appeared too large as compared with corresponding divisions slightly lower on the scales. Therefore, despite the apparently satisfactory calibration of the instrument, the accuracy of division of the scales was examined by the method described in Part II in the section on calibration (Instrumentation Studies XLI (*2*)). The following equation numbers all refer to equations in Part II.

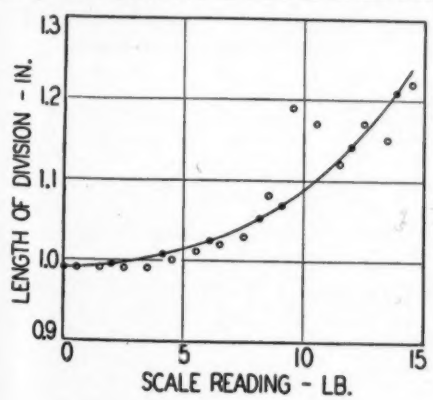


FIG. 2
Relationship Between Length of Scale Division and Scale Reading

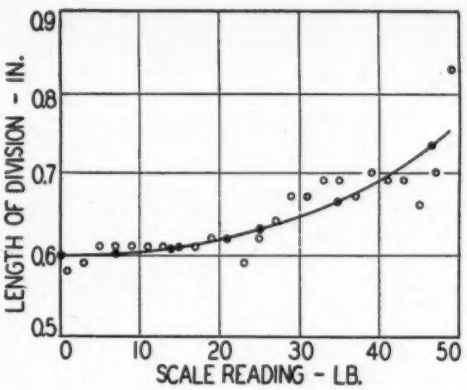


FIG. 3
Relationship Between Length of Scale Division and Scale Reading

Measurements were made to permit the calculation of the constant C' of Equation 11 for each of the three scales of the instrument. The pendulum was displaced until the pointer registered nine pounds on the 15-pound scale, and the angle which the pendulum made with the vertical was measured and found to be 22 degrees. It was noted that the pendulum moved through an angle of about 2.5 degrees when the pointer moved through a scale division corresponding to one pound. This angle was small enough to warrant the use of Equation 11. The distances between several pairs of graduations one pound apart were measured in the neighborhood of the nine-pound division with dividers, and the average value was taken to be 1.07 inches. The value of C' was calculated from Equation 11; using a value of 1.07 inches for ΔS, of 9.0 pounds for T, and 22 degrees for θ. The value of C' was found to be 0.99 inch per pound. This value of C' was used to calculate, by means of Equation 11, the values of ΔS for a number of positions along the scale using a one-pound change in load for each calculation—i.e., letting ΔT equal one pound. The values of the loads corresponding to these positions were calculated from Equation 2 after the value of C was obtained by substituting the known values—namely, T equal to nine pounds and θ equal to 22 degrees. The value of C was found to be 24.0. The curves drawn through the solid points plotted in Fig. 2 show the resulting

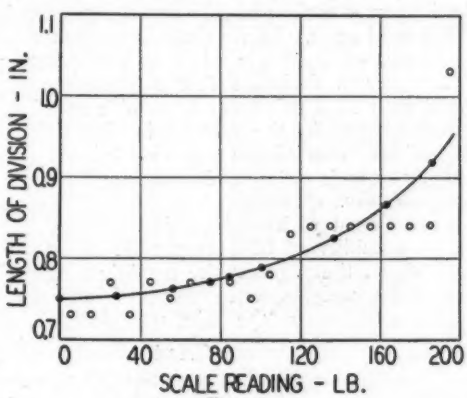


FIG. 4
Relationship Between Length of Scale Division and Scale Reading

relationship between ΔS and load. The actual distances between one-pound divisions on the scale were measured with dividers and the values are plotted as open circles in Fig. 2. The points are plotted at a value of the load midway between the scale divisions —e.g., the distance between the eight- and nine-pound divisions was plotted at 8.5 pounds.

Similar calculations and measurements were made for the 50- and the 200-pound scales of the instrument. The results are shown in Figs. 3 and 4.

The curves drawn through the calculated points in Figs. 2, 3, and 4 are not necessarily the ones on which observed points should fall accurately since the position of these curves depends upon the choice of scale division from which the value of C' was calculated. If an inaccurate value for this scale division were chosen, the curves would be shifted slightly from their proper positions; however, the general shape of the curves would not be changed. The fact that the observed points do not fall upon a smooth curve indicates that the scale was not accurately divided. There are some large deviations from a smooth curve and, although the cumulative error may be small, the scale at certain points is in error by approximately 0.7% of full-scale load.

Friction was negligible in this instrument. The pendulum oscillated freely and during the calibration no change in scale reading was noted when the instrument was tapped.

The tensile strengths of a number of papers were measured with the Amthor instrument and with another instrument whose calibration had been carefully studied. After correction for errors in calibration, the results obtained with the two instruments agreed satisfactorily.

The instrument is easy to operate. The control for the driving mechanism and the clamps are conveniently placed for rapid operation. The scale is easy to read, although on the 200-pound scale it is necessary to note the readings from the side of the pendulum rather than from directly in front of the scale, due to the fact that the large weights on the pendulum obscure the pointer.

When this particular instrument was first used, the specimens consistently broke at the upper clamp. This was due to the fact that the jaws did not meet accurately; the trouble was corrected by shimming one of the jaws.

This particular instrument operates at only one speed—namely, 12 inches per minute. This speed yielded average rates of loading of 2.5 pounds per second on the 15-pound scale, 7.5 pounds per second on the 50-pound scale, and 27 pounds per second on the 200-pound scale. In view of the current discussion of rates of loading as low as one pound per second, it seems desirable that the instrument be equipped with cone pulleys or a variable speed drive to permit change in the rate of loading from the present values. The friction clutch worked very satisfactorily, although on several occasions it failed to engage promptly.

The instrument withstood continuous exposure to a relative humidity of 65% very well. Rusting occurred only at the pegs on the pendulum on which the auxiliary weights were fastened and on the weights at spots where the paint was chipped off.

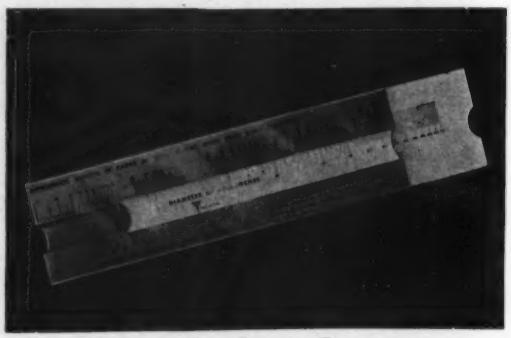
Literature Cited

(1) The Institute of Paper Chemistry, Paper Trade J. 115, no. 5: 12; no. 7: 14; no. 19: 18 (July 30, Aug. 13, Nov. 5, 1942).
(2) The Institute of Paper Chemistry, Paper Trade J. 115, no. 26: 14 (Dec. 24, 1942).

Ready Roll Length Reckoner

A handy roll length calculator has been developed by The Cameron Machine Company, of Brooklyn, N. Y., to enable paper mill superintendents, also operators of slitting and roll winding machines as well as web fed processing machines to determine promptly the number of feet of paper or paper board in a roll, when the diameter of the roll is known and the thickness or caliper of the web is checked in thousandths of an inch.

The calculator is arranged to enable determination of the length of paper in rolls of any diameter up to 17 inches, when the caliper of the paper is one half



CAMERON ROLL LENGTH CALCULATOR

thousandth of an inch. As the caliper of the web increases the scale permits determination of the length of paper in rolls of gradually increasing diameter. For instance, at five thousandths caliper, roll length can be determined for any diameter roll from one to fifty-five inches, while at fifty thousandths caliper roll length can be determined for any diameter roll up to seventy two inches.

This attractive and durable calculator will be furnished gratis to any one in the industry, writing to Cameron Machine Company on their company letterhead.

The Story of Winfield H. Smith Inc.

Winfield H. Smith, Inc., manufacturer of speed reducers, realizing that many customers and prospective customers have no conception of the background behind the business nor the physical extent of the manufacturer's facilities, has effectively explained what and who they are by issuing a well-illustrated "institutional" booklet . . . "There Is More Than Meets the Eye in Speed Reducers."

Whereas the regular WHS speed reducer catalog sells the product, this new booklet sells the company behind the product. If you would like a copy, address Winfield H. Smith, Inc., Springville, Erie County, N. Y. There is no charge.

Elk Paper Mfg. Co. Elects Officers

At a meeting of the board of directors of the Elk Paper Manufacturing Company, Childs, Md., on January 20, 1943, the following officers were elected:—G. Howard Bathon, president; Roy E. Bare, vice-president and superintendent; Charles T. Haberman, vice-president and sales manager; L. S. Zimmerman, secretary and assistant treasurer, and Marple H. Lynch, assistant secretary and treasurer.

Paper Goes to War

The proof that paper *is* as essential in war as in peace will be impressively demonstrated in the Paper Prevents Battlenecks Exhibit of the Technical Association of the Pulp and Paper Industry at the Hotel Commodore, New York, N. Y., February 15-18, 1943, according to R. G. Macdonald, secretary of the association. Vincent Waters of the TAPPI staff, is in charge of the exhibit. The War Department, airplane manufacturers, paper manufacturers, paper converters, and users of paper for packaging their products have cooperated with the association to make this a most comprehensive display of pulp, paper and paper board products used to conserve critical metals, rubber, and shipping space and weight, yet affording complete protection.

War Department to Exhibit

The War Department's Exhibit Division, through Exhibits Director S. G. Somers, has prepared a special booth for the display of many items made of paper for the Arms and Services of the United States Army. Ammunition and ration containers, camouflage nets, ordnance protective wrappers and containers. Chemical Warfare Service items, and projectile containers will be included from the War Department and other exhibitors.

Airplane parts fabricated from paper laminate, a newly developed product; paper board drums, replacing 54-gallon steel drums; paper and paper board containers with various designs of closures, replacing metal tooth powder, spice, drug, and cosmetic containers; paper folding boxes with individual compartments for small arms ammunition; folding paper boxes with insert bags for powdered milk, eggs, etc.; containers for tobacco products, replacing metal; integrated paper lunch-tray sets for war plants; waterproof, water vaporproof, grease and oilproof paper bags, boxes, and wrappers; and paper-base plastic machine parts are among the hundreds of products made of paper which are saving shipping weight and space, conserving metals, and helping to prevent "battlenecks."

Relieves Drain on Critical Materials

The possibilities in the use of pulp, paper, and paper board are not generally known, yet they are probably the most versatile materials available in large quantities to relieve the drain on the nation's stockpile of critical metals. Many of the problems are rather well-defined, but the solutions of the problems are not always simple. The exhibit indicates the accomplishments in relieving the critical material shortages and serves to give designers, engineers, and operators ideas to conserve more metals, shipping space and weight in the development of more specific uses in the war effort. The exhibit is impressive in the variety, complexity, and effectiveness of the work done in developing new and extending many old uses of pulp and paper.

Some of the uses in which pulp, paper, and paper board are now being utilized are considered as war expedients. The end of the war will find many of these uses firmly established as entirely satisfactory permanent uses for these products because of the protection afforded goods in shipping, effective direct labeling, reduction in shipping space and weight, and low cost of the containers, packages, and wrappings.

Paper Prevents Battlenecks Exhibitors

The following is a partial list of the exhibitors:—

American Can Company, American Viscose Corporation, Arkell Safety Bag Company, Army, United States, Beech-Nut Packing Company, Bigelow-Sanford Carpet Company, Bird & Son, Inc., Brown & Williamson Tobacco Corporation, F. N. Burt Company, Inc., Carpenter Container Corporation, Coast & Geodetic Survey, U. S. Department of Commerce, Colgate-Palmolive-Peet Company, Cross Paper Products Corporation, Container Company, Elmer Candy Company, Inc., Ex-Lax, Inc., *Food Industries Magazine.*

Robert Gair Company, Inc., Gardner-Richardson Company, Gaylord Container Corporation, General Cellulose Company, Inc., General Mills, Inc., General Printing Ink Company, Hill Packing Company, Hinde & Dauch Paper Company, Interchemicals Corporation (IPI), Interstate Folding Box Company, Johnson & Johnson, Kalamazoo Vegetable Parchment Company, Keystone Envelope Company, Keystone Roofing Manufacturing Company, Kimberly-Clark Corporation, Larus & Brother Company, Inc., Lederle Laboratories, Lily Tulip Cup Company.

Marathon Chemical Company, Marathon Paper Mills Company, Matthias Paper Corporation, Menasha Products Company, Michigan Research Laboratories, Inc., *Modern Packaging Magazine,* Mono Service, Monsanto Chemical Company, Mutual Paper Company, Inc., Myles Salt Company, National Association Service, Old Dominion Box Company, Oxford Filing Supply Company, Paper Shipping Sack Manufacturers' Association, Quikut Home-Papers, F. A. Read, Inc., Reynolds Metals Company, TAPPI, Kalamazoo Valley Section, Thomas M. Royal & Co.

Sinclair & Valentine Company, Sisalkraft Company, Socony-Vacuum Oil Company, Sonoco Products Company, Southern Pulpwood Conservation Association, Stecher-Traung Lithograph Corporation, Thilmany Pulp and Paper Company, C. E. Twombly Company, United Drug Company, U. S. Department of Commerce, U. S. Envelope Company, War Department, Camouflage Division, War Department, Chemical Warfare Service, War Department, Ordnance Department, War Department, United States Army, Waterbury Box Company, Westinghouse Electric and Manufacturing Company and Wrenn Paper Company.

Parsons Paper Co. Reelects Officers

All the officers and directors were re-elected at the annual meeting of the Parsons Paper Company, Holyoke, Mass. The officers are: President, John L. Bagg of Greenfield; vice-president and general manager, Henry V. Burgee; treasurer, E. B. Cooley; secretary, A. C. Canfield. The directors are John L. Bagg, Mr. Burgee, Mr. Cooley, Dr. E. P. Bagg, Jr., Atty. Clifford S. Lyon, Roy McCorkindale and Richard M. Weiser. The directors have voted a leave of absence to E. P. Bagg, 3d., who has been commissioned an ensign in the Navy. He has been assistant general manager.

Second Cut of 10% Believed Adequate

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 9, 1943—The best available figures on the print paper situation indicate that a second cut of not to exceed ten per cent effective April 1 will be adequate to meet the current situation caused by the war.

According to W. G. Chandler, Director of the Printing and Publishing Division, and Donald J. Sterling, Consultant on Newspaper and Publishing Industries, to the WPB Chairman, this program is arrived at after consultation with the Pulp and Paper Division and with the several claimant agencies involved.

Such an additional cut is compelled solely by war needs and factors of paper production. Its application is in line with the initial policy of solving this problem by one or more moderate reductions.

Equitable allocation of the print paper available after April 1 should not work undue hardship upon any publication nor handicap its essential service to the nation in wartime. The present cut in use of print paper went into effect in January.

As in the case of the first order governing the use of print paper, the second order will deal only with the allocation of the available supply. WPB will not attempt to say how the publisher shall use his print paper allotment.

This statement is made because of the widely varying reports which have been circulating as to additional cuts to be made in the use of print paper.

Maj. C. H. Cooke Dies in Plane Crash

Major Charles Harvey Cooke, 26, formerly connected with the Stanford Paper Company, Washington, D. C., was killed recently in a plane crash near Cape Cod, Mass. Charles H. Cooke, father of Major Cooke, said that he had been informed that his son's body was found in the wreckage of the plane along with that of the pilot.

Maj. Cooke was a graduate of McKinley High School and the University of Maryland, where he was a member of the class of 1937. At the university he was prominent in athletics and campus life.

For three years he was a member of the university's lacrosse team and also played one year as guard on the football team. He was student manager of the football team in his senior year.

At the university he was a member of Sigma Phi Sigma, social fraternity; Omicron Delta Kappa fraternity; Scabbard and Blade, a military fraternity, and of the Rossbourgh Dance Club.

Maj. Cooke was a member of the Reserve Officers Training Corps at the university. He entered the Army in February, 1941, as a first lieutenant and reached the grade of major last January 6.

Paper Orders Exceed Supply

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., February 6, 1942—Paper orders in this territory continue to exceed the available supply and indications are that the same condition will exist for some time to come. Lower production at the mills has caused extreme inconvenience to local converters and jobbers, whose inventories are low and who have no possible chance, apparently, of building them up.

The converters in this area are not so badly hit as many other branches of the trade, for much of their output goes directly to defense plants and many of them are able to get priorities which can keep them operating. However, they would be much better pleased if the general situation were improved. Box and container factories in this entire section continue to operate to capacity, which is limited by the amount of raw materials and the labor supply. The latter is particularly a tough problem at this time. The regular defense plants, with their high scales of wages even for the most ordinary labor, has depleted forces in the paper factories. It even is difficult to secure women for those jobs where women might be used. The women are following the men into the defense plants.

Fine paper demand continued good last week with books, covers and ledgers moving nicely and prices firm to strong. Local jobbers are among those who are finding it increasingly difficult to replace labor lost to the armed forces and defense plants.

Newsprint demand was good with lineage about the level of last year. Local papers are making every effort to curtail their use of newsprint and still not sacrifice space for advertising and news.

Buying of rags, particularly best quality cuttings, was steady last week with prices well held, though with no important changes. Buying of waste paper generally was quiet.

Manhattan Rubber Enters 50th Year

During 1943, with the large plant's manufacturing facilities geared to produce war materials at full capacity, the management and personnel of the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J., will reflect solemnly, but with pride, that the Division will celebrate the fiftieth anniversary of its founding as the Manhattan Rubber Manufacturing Company.

The original company was incorporated on October 28, 1893, during the panic which lasted from 1893 to 1897. The fact that the founders entrusted their investments to those in management during those days of uncertainty bespoke the faith they had in the men who managed and built up the enterprise into one of the largest manufacturers of mechanical rubber goods.

Manhattan Rubber's progress was coincident with an American era of industrial expansion, but its growth has been gradual and conservative.

Manhattan Rubber is one of the largest manufacturers of mechanical rubber goods, including conveyor and transmission belting, V-belts, hose, molded goods, rubber covered rolls and rubber lined tanks. The company is also among the leading makers of asbestos friction materials and abrasive wheels. At present the plant is humming with war orders, producing large quantities of materials for the aviation, shipbuilding, steel, mining and other vital industries.

Harry E. Smith is general manager, John H. Matthews, assistant general manager, and Charles T. Young, factory manager.

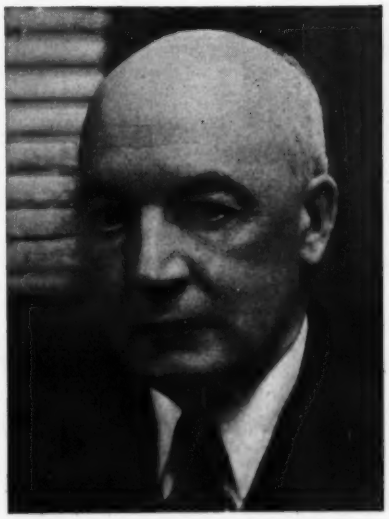
Albermarle Co. Loses

The Albemarle Paper Manufacturing Company for the nine months to December 31, reports a net loss of $103,801, in contrast to net income of $350,389 for nine months ended December 31, 1941; net sales, $2,844,145, compared with $3,850,053.

N. W. Pickering Resigns Presidency

Captain Nelson W. Pickering, USNR, has been ordered to report for active duty in the United States Navy on February 1, and accordingly has resigned as President of Farrel-Birmingham Company, Inc., of Ansonia, Connecticut, and Buffalo, New York. Captain Pickering has been assigned to duty as commander of U. S. Navy Section Base at New London and commander of local defense forces in that area.

Before coming to Farrel-Birmingham Company in 1919, Captain Pickering served for fifteen years in the Navy. After his graduation from the United States Naval Academy in 1908, he was assigned to sea duty, and subsequently was selected for post-graduate instruction in ordnance engineering, which included duty at the Naval Gun Factory, Washington, D. C., the proving ground at Indian Head, Maryland, and the Bethlehem Steel Company. He then



CAPTAIN NELSON W. PICKERING

was sent to England to complete the instructional course at Barr Stroud Optical Works, Glasgow, Scotland, and the Whitehead Torpedo Works, Weymouth, England. Following another tour of sea duty, devoted primarily to gunnery work, he served as Chief of the Gun Section, Bureau of Ordnance, Navy Department, which post he held through the early part of the World War. Upon completion of this duty he was assigned to duty overseas in connection with ordnance matters pertaining to heavy gun construction and liaison work with the Naval railway batteries in France. After the Armistice he served for a year as gunnery officer of the U.S.S. North Dakota.

In 1919 he resigned from the Navy and started work in the Roll Department of Farrel Foundry & Machine Company, becoming, successively assistant manager and manager of that department. In February, 1930, he was elected President of Farrel-Birmingham Company, Inc., with executive direction of the company's three plants at Ansonia and Derby, Connecticut, and Buffalo, New York.

After coming to Ansonia, Captain Pickering took an active interest in the industrial and civic life of the community. He has been active in trade associations, having served two terms as president of the National Metal Trades Asssociation, also as vice-president and director and on committees of the National Association of Manufacturers and the Manufacturers' Association of Connecticut.

During his business career Captain Pickering maintained his interest in the naval service. Besides retaining his commission in the United States Naval Reserve, he commanded the Naval Reserve Force and Naval Militia in the State of Connecticut from 1924 until 1940, when the battalion was called into active service. He was Naval Aide to Governor Trumbull and also served in the same capacity during Governor Baldwin's first term.

At a testimonial dinner tendered to him by civic and business associates at the Hotel Clark in Derby on January 25, Captain Pickering was presented with a handsome silver tray bearing the simple inscription "To Captain Nelson W. Pickering from his Ansonia Friends," in token of their respect and esteem.

To Speak at Tissue and Writing Meetings

Colonel Charles M. Piper, business analyst and member of the Advisory Committee of the Office of Price Administration, will speak at the Annual Industry Meeting of the Tissue Association and the Writing Paper Manufacturers Association. Colonel Piper is scheduled to speak at the Tissue Meeting Monday, February 15, at 10:00 A. M., and at the Writing Paper Meeting Tuesday, February 16, at 11:30 A. M., Waldorf-Astoria Hotel, New York City.

Colonel Piper is a business analyst of outstanding ability. He speaks straight from the shoulder, in language that the American business man can understand. He was born and reared in Indianapolis, Indiana, and was graduated from the University of Indiana in 1914 with an AB degree. Colonel Piper rose to the rank of Colonel of Field Artillery from an army buck private. He is now on the inactive reserve list.

The son of a manufacturing machinist employing several hundred men, Colonel Piper's experience in American business was acquired the hard and practical way. His experiences as a business analyst extend into many fields, having been associated with Goodyear Tire & Rubber Company, Fisk Rubber Company, Johns Manville, and others, along with a wide practice in business as a counselor to management.

Announces "Priority Clinic" Meeting

The American Paper and Pulp Association announces that the interesting sectional meeting, "Priority Clinic," will again be held this year as a feature of the convention of the association. The discussion will be led by J. L. Ritchie of the Pulp and Paper Branch of the War Production Board.

This meeting, in the form of a question and answer discussion, will deal especially with the Control Materials Plan and the Procurement of Maintenance, Repair and Operating Supplies under plans to be announced. H. M. Gray and E. G. Amos of the association's staff will assist Mr. Ritchie.

The meeting will be held Wednesday, February 17, at 3 P. M. in the Astor Gallery on the third floor of the Waldorf-Astoria Hotel, New York.

Wage Order Effective February 15

L. Metcalfe Walling, administrator, Wage and Hour Division, U. S. Department of Labor, announces that the recommendations of Industry Committee No. 48 for a 40-cent minimum hourly wage rate in the converted paper products industry, have been approved and the wage order will become effective February 15, 1943.

The converted paper products industry to which this wage order applies is defined as follows:

The manufacture of all products which have as a basic component pulp, paper or board (as those terms are used in Administrative Order No. 41 defining the pulp and primary paper industry) and the manufacture of all like products in which synthetic materials, such as cellophane, pliofilm, or synthetic resin, used in sheet form, is a basic component. Provided, however, that the manufacture of the following shall not be included:

(a) Any product the manufacture of which is covered by a wage order of the administrator relating to the textile, apparel, hat, millinery, shoe, pulp and primary paper, carpet and rug, portable lamp and shade, or luggage, leather goods and women's handbag industry.

(b) Any product, such as rayon, cellophane, etc., made from such pulp by a process which involves the destruction of the original fibrous structure of such pulp.

(c) Roofing paper, insulation board and products therefrom for use as building materials, or shingles.

(d) Newspapers, magazines, books, blueprints, photographs and other products in which graphic art is the exclusive medium through which the products function, provided, however, that the production of printed forms, stationery, blank books, and tablets, other than the printing thereof in a job printing establishment, and the production of other products in the use of which graphic art is applied by the ultimate consumer of the products, shall be included within the converted paper products industry as herein defined.

The definition of the converted paper products industry covers all occupations in the industry which are necessary to the production of the products specified in the definition, including clerical, maintenance, shipping and selling occupations; provided, however, that where an employee covered by this definition is employed during the same workweek at two or more different minimum rates of pay, he shall be paid the highest of such rates for such workweek unless records concerning his employment are kept by his employer in accordance with applicable regulations of the Wage and Hour Division.

Dr. Baker Ten Years at M. S. C.

The tenth anniversary of President H. P. Baker's inauguration as the Head of Massachusetts State College on January 20, 1943, is of interest to readers of the PAPER TRADE JOURNAL, because President Baker was associated with the industry from 1920-28 as Executive Secretary of the American Paper and Pulp Association. To him may justly be ascribed in part at least the definite stand paper manufacturers have taken with reference to forest conservation. Before he was employed by the association there was no general appreciation of the necessity of making sure of a permanent supply of pulpwood in order to have a solid financial foundation for the tremendous investment which a modern paper mill entails.

President Baker had had an opportunity of looking around the United States and knew that its forest resources were not unlimited. Then, too, his study in Europe has convinced him that not only was paper making in its infancy but also that wood would become an increasingly important source of raw material. Perhaps more important still were the practical instances of the use of second grade forest growth for pulpwood which Europe presents. This meant that a combination of sawmill and pulpmill not only gave more complete utilization than cutting sawlogs alone would afford, but also furnished a market for material which would have otherwise rotted in the woods. Furthermore, a pulp market made it economically possible to thin over-crowded stands. Forest conservation is wise use, not merely refraining from cutting. Dr. Baker could see that while the more primitive American conditions made it advisable sometimes to cut with the paper market in view alone, a pulp mill could eventually become a most useful supplement to a sawmill and that the paper industry was therefore a business that had a permanent future in America. So he is proud to look back at his connection with the American Paper and Pulp Association and remember that he helped to build up an industry that has furnished important products of its own, given raw material to other businesses and at the same time been of great help in developing American forest resources.

The recent pulp expansion in the Southeast is another project which President Baker helped to develop. He had long seen the opportunity to open a new field there and give the South an industry that would help develop its resources on a sound, permanent basis.

While President Baker can look back with justifiable pride to his connection with the American Paper and Pulp Association, he would be the first to acknowledge the value of his experience as Executive Secretary. It is rarely that an educator has had such a broad training and knows the business world as well as to how students and faculty think and act. And yet, an educational institution must not only do research and teach but also manage its finances so as to keep solvent and at the same time commend itself as a bulwark of sound sense, morals, and progress.

Sign Trade Agreement with Mexico

A Reciprocal Trade Agreement has been concluded with Mexico, and it will be effective January 30, 1943, according to the Import Committee of the American Paper Industry. No duties on incoming merchandise affecting the United States were changed, but a series of Mexican tariff items involving paper were bound, Mexico pledging itself not to increase the existing rates during the life of the agreement. The duties on fiber insulation boards and wall boards, certain types of paper of the natural color of the pulp, and those on sanitary paper, paper towels and cleansing duties were all bound at existing rates.

The president has also issued a formal proclamation putting the Reciprocal Trade Agreement with Uruguay into effect. The only item in this agreement affecting the paper industry is the confirmation, as far as Uruguay is concerned, of the new duty rate on casein which was reduced in the Argentine agreement.

Improved Line of Check Valves

The Williams Gauge Company, 2071 Pennsylvania avenue, Pittsburgh, Pa., announces an improved line of check valves which are furnished in a wide variety of metals and sizes. Designated as the Williams-Hager Flanged Silent Check Valves, they are manufactured of bronze, cast iron, steel, stainless and monel metal for pressures varying from 150 to 2500 lbs. to meet American Standard. Sizes range from 1 inch to 20 inches inclusive.

Simple, compact and rugged in design, Williams-Hager Check Valves have but two parts subject to wear—the valve disc and seat. Both are easily removable and renewable, and the valve can be reseated without special tools. It should be noted particularly that the spring ring is now built as an integral part of the body.

These new valves are recommended for use in waterworks, oil refineries, chemical works, air conditioning systems, hydraulic services, boiler feed, water supply and other non-return flowlines. In general they may be used in all pump lines handling water, oil, gas, acids, alkalies and other fluids. The manufacturer will furnish complete information on request.

Test 2,000 Plants for Rubber

Nearly 2,000 varieties of plants found in this hemisphere have been tested for rubber since March 1942, by investigators of the department of agriculture at Cornell University, Ithaca, N. Y., it is announced.

The search for native plants as a source of natural rubber to replace supplies cut off by war was undertaken by Cornell scientists working with the B. F. Goodrich Company, Akron, Ohio, which gave financial aid to the project.

A new quick process to indicate how much rubber and resins plants contain has been developed by the university researchers. Only five minutes are required to give an approximate idea of the natural rubber in plant tissues, the university reports.

Most of the plants so far examined show rubber content too low for commercial use, but some contain sufficient resin to warrant further study as possible sources of materials for synthetic rubber, a recent report stated.

On the basis of the Cornell studies the Russian dandelion appears to be the most promising emergency rubber-bearing plant for growth in the North. The rubber content of this plant can be easily obtained by mechanical means and after rubber is extracted from the roots can also be used for alcohol production.

Professor Lewis Knudson, who is directing Cornell's plant research program, said that in normal times the yield obtained from this variety of dandelion would hardly pay the cost of production here even though the seed and the residue of the crop could be used.

B. C. Plans Reforestation

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., February 12, 1943—Planting of 7,500,000 trees on 8000 acres of denuded timber lands will start as soon as weather permits. Such is a main feature of the B. C. Forest Service's reforest program for 1943.

Denuded timber areas where young growth will be set out include Cowichan Lake, Robertson River, in the Cowichan Lake district; timberlands back of Ladysmith; and near Bowser, in the Campbell River district, planting projects will include Loveland Lake, Lower Campbell Lake, Menzies Bay and Quinsam Lake areas.

Three years ago, following ten years of experimental plantings, Hon. A. Wells Gray, minister of lands, embarked upon an active and intensive policy of reforestation. Since that time no less than 18,500,000 trees have been set out on 22,600 acres of logged over lands. This is the equivalent of roughly 30 square miles.

In his efforts to rebuild the timber wealth of the country for future generations the minister of lands has been limited only by the capacity of the available forest nurseries to produce young growth.

Trees are started in these nurseries from seed and are then transferred to selected areas for planting under direction of the experts of the forest services. Prior to plantings soil is tested and growing possibilities are studied in the departmental laboratories.

During 1941 there were 8,700,000 trees set out on 10,700 acres. Last year, owing to loss of small stock through freezing, the plantings dropped to 6,600,000 trees, while this year 7,500,000 will be put in the ground.

Losses after planting, it has been found, mostly during the first year, only amount to 15 per cent.

Paper an Essential Industry

In reply to press releases issued by Government agencies which threatens the operations of many paper mills, E. W. Tinker, executive secretary of the American Paper and Pulp Association, sent a letter on February 5 to the industry including a copy of the telegram the association sent to WPB, the Office of Civilian Supply, and the War Manpower Commission, as follows: "Press releases from War Manpower Commission and Office of Civilian Supply have created chaotic condition in pulp and paper industry which promise have serious effect production papers absolutely necessary prosecution war and maintenance essential civilian business. May seriously affect not only communication and sanitation as well as other essential activities. Paper industry already operating under limitation order and present publicity implying entire industry non-essential resulting in mass movement skilled men and others in leaving mills. Strongly protest in behalf of industry action taken and recommend immediate remedial statement. Under existing circumstances industry cannot assume responsibility filling essential orders."

Mr. Tinker also stated that "strong efforts are being made in Washington by the association to get all necessary grades of paper classified as essential and also an effort is being made to have occupational deferments for essential jobs in the paper industry. We have every reason to believe that the pulp and paper mill employee will be classified as 'deferable'."

Obituary

Augustus J. Johnson

The paper industry on the Pacific Coast lost one of its best known paper men in the passing of Augustus J. Johnson, who was buried on Friday, January 22, 1943.

Mr. Johnson was born in Philadelphia in 1875 and as a lad came to Tacoma and began his first entrance into the paper business by becoming a stenographer for the Everett Pulp and Paper Company at Lowell, Washington, in 1895.

In 1897 he was transferred to their San Francisco sales office, at that time under the management of James I. Taylor, of the famous Taylor family of early paper making fame in California.

In 1901, as a foreign salesman for the Everett Pulp and Paper Company, he visited China, Philippine Islands, Australia, South and Central America, etc.

In 1903 he went back to the mill in charge of the order department and in January, 1906, was elected assistant treasurer and secretary of the company. He was placed in charge of the sales for the State of California in 1908. From that time until 1933 he was with the company in that capacity.

Mr. Johnson is survived by his widow, a brother and two sisters. Burial service with Masonic rites was held from the Chapel of the Chimes at Piedmont, Cal.

His honorary pallbearers were all very close friends in the paper and lithographing business.

Mr. Johnson was a Shriner and greatly respected for his knowledge of the business and for his fine character.

James A. Bayley

James A. Bayley, 71, of 129 Haley street, former superintendent of the Island Paper Company mill at Carthage, died at 8:20 Thursday evening in the House of the Good Samaritan, Watertown, Mass., where he had been a patient since October 27. Death was caused by a heart condition.

James Augustus Bayley was born October 9, 1871 at Dexter, a son of Eugene A. and the late Elizabeth Brennan Bayley. He was educated in the Dexter public schools and for years was employed in paper mills of that village.

With his family he moved to Carthage in 1913 and until the summer of 1940, when he retired on account of illness, he served as superintendent of the Island Paper Company mill.

Guy S. Wood

Guy S. Wood, 54, manager of the international Paper Company mill at Herkimer, N. Y., for seven years, died January 30 at his home in Palmer where he moved recently upon transfer to the engineering department of the Hudson River mill at Corinth.

A native of West Chazy, near Plattsburg, where he was born August 8, 1888. He was graduated from Rensselaer Polytechnic Institute in 1912 with the degree of civil engineer.

After engaging in several projects, among them subway construction in New York, he entered the engineering department of the International Paper Company June 9, 1919. For several years he was a field engineer in charge of plant construction work at Palmer, Glens Falls, and Berlin, N. H. He also supervised erection of two large company newsprint mills at Three Rivers and Gatineau, Quebec province, Canada.

Subsequently, Mr. Wood was in charge of constructing kraft paper mills for International in the South, and then became sales engineer for a subsidiary company, the Montague Machine Co., Turners Falls, Mass.

He became manager of the Herkimer mill in the fall of 1935, following the death of Fred D. Gray, long superintendent, and continued until last December when the local plant was temporarily closed.

Surviving are his wife and one daughter, Mrs. Harold Waldson, New York. Services were held from the home in Corinth and burial was in West Chazy.

William P. Watt

William P. Watt, 49, treasurer of the Howard Paper Company, Inc., Boston, died at his home, 2 Anawan terrace, West Roxbury, Mass., February 4. Mr. Watt, who had been associated with the Howard Paper Company for a considerable period, was a respected member of the New England Paper Merchants Association, and of the Order of Masons.

A wife, Mrs. Mabel Watt; two daughters, Mrs. Harry Hollis and Miss Mina Watt, and a son, William, in the armed services in North Africa, are living.

Will Attend Paper Merchants Meeting

BOSTON, Mass., February 8, 1943 — Among the members of the New England Paper Merchants Association who expect to attend the 40th Annual Convention of the National Paper Trade Association of the United States, Inc., in New York, February 15-18, are Samuel L. Ginsburg, Henry Nadel and Leo Flax of Ginsburg Brothers, Inc., Somerville, Mass.; F. Bendel Tracy, John E. Roach and William C. Ross of the Fort Hill Paper Company, Boston; John F. Blackman and A. H. Whitney of D. F. Munroe Company, Boston; Gilbert T. Singleton and Lewis C. Bills of Robbins Paper Company, Boston; Charles A. Esty, J. R. Halkyard and R. Welsh of Carter, Rice & Co., Corporation, Boston; Ralph Bass of Ralph F. Bass, Inc., Roxbury (Boston); J. E. Gilfix, of G. & S. Paper Company, Inc., West Newton, Mass.; H. A. Hurlbert of Hurlbert & Hatfield, Boston; Charles A. Shaw of Whitney Brothers, Inc., Boston; F. H. Merrill and Fred Herbolzheimer of Andrews Paper Company, Boston; Edward Dowd and C. J. Knutson of H. J. Dowd Company, East Cambridge, Mass., and Walter R. Guild, Executive Secretary, Boston.

Display Products for Armed Services

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., February 8, 1943—A display of products of the United States Envelope Company at the office of the Century Paper Company, showing items used in the armed services includes Flight Envelopes, Tissue Packet War and Navy Department Envelopes, Ration C Bags, Ration D Bags, Ration J Bags, Salt Container, Sulfa Drug Package, Suture Envelopes, Waxed Packing List, Suecial Payroll Envelope, and Window Payroll Envelope.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending February 6, 1943

STOCKS

	High	Low	Last
A. P. W.	2¾	1⅝	2⅝
Armstrong Cork Co.	34⅜	33¼	33⅞
Celotex Corp.	10½	9⅝	10¼
Celotex Corp., pf.	86½	80½	86
Certain-Teed Products Corp.	3⅞	3¼	3¼
Certain-Teed Products Corp., pf.	38⅜	37½	38
Champion Paper & Fibre Co.	19	19	19
Champion Paper & Fibre Co., pf.	100	100	100
Congoleum Nairn Co.	18⅛	17⅞	18
Container Corp. of America	18⅞	18½	18¾
Continental-Diamond Fibre Co.	9	8½	8¾
Crown-Zellerbach Co.	12¾	12⅜	12¾
Crown-Zellerbach Co., pf.	89	87	89
Dixie-Vortex Co.	11¼	11	11
Dixie-Vortex Co.—A.	39¼	39	39
Flintkote Co.	17¼	16½	17⅛
Robert Gair	2⅜	2⅛	2⅜
Robert Gair, pf.	11½	10¼	11½
International Paper Co.	10	9⅜	10
International Paper Co., pf.	55	53	55
Johns-Manville Corp.	71¼	70	71
Johns-Manville Corp., pf.	....	....	....
Kimberly-Clark Corp.	29¾	28	29¾
MacAndrews & Forbes	23	22½	23
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	34¼	33½	33¾
Mead Corp.	7¾	7⅜	7¾
Mead Corp., pf. A—6%	75	73	75
Mead Corp., pf. B—5½%	66	66	66
Paraffine Companies, Inc.	38½	37½	38½
Paraffine Companies, Inc., pf.	102	102	102
Rayonier, Inc.	12¾	12¼	12¼
Rayonier, Inc., pf.	29	29	29
Ruberoid Co.	22⅞	21½	22¾
Scott Paper Co.	43	42½	42½
Scott Paper Co., pf.	110¾	110½	110¾
Sutherland Paper Co.	27	26⅜	27
Union Bag & Paper Corp.	9⅝	8¾	9⅝
United Paperboard Co.	3⅞	3⅜	3¾
U. S. Gypsum Co.	60¾	59	59
U. S. Gypsum Co., pf.	175	175	175
West Virginia Pulp & Paper Co.	13¾	13⅛	13¾

BONDS

Abitibi Pulp & Paper Co. 5s '53	55	55	55
Celotex Corp. 4½s '47	101	100	100½
Certain-Teed Products Corp. 5½s '48	95½	94¼	94¼
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	106	105¾	106
International Paper Co. 5s '47	104	103¾	103¾
Mead Corp. 3¼s '55	....	....	....
West Virginia Pulp & Paper Co. 3s '54	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending February 6, 1943

STOCKS

	High	Low	Last
American Box Board Co.	5¼	5	5⅛
Brown Co., pf.	....	....	....
Great Northern Paper Co.	31½	30½	31¼
Hummel-Ross Fibre Corp.	3⅞	3½	3⅞
National Container Corp.	10	9¼	9¼
St. Regis Paper Co.	2⅜	2⅛	2⅜
St. Regis Paper Co., pf.	122¼	119½	119½
Taggart Corp.	4⅛	4	4

BONDS

American Writing Paper Co. 6s '61	....	....	....

United Paperboard Nets $1.79

The United Paperboard Company and subsidiaries for the six months to November 28, reports a net profit of $15,622, equal to $1.79 a share on 6% non-cumulative preferred stock, compared with $192,561, or 69 cents a share on common stock after allowing for preferred dividend requirements for six months ended November 30, 1941.

Rhinelander Profits Up

The Rhinelander Paper Company for the year to September 30, reports a net income of $488,268 or $3.26 each on 150,000 capital shares, against $524,148 or $3.49 a share in year to September 30, 1941; net sales, $6,036,333 compared with $4,566,837.

Scott Co. Declares Dividend

The Board of Directors of the Scott Paper Company, at a meeting held January 22, declared a quarterly dividend of 45 cents per share on the company's outstanding common shares, payable March 12 to shareholders of record at the close of business on February 27, 1943.

At a meeting held the same day, the Board of Directors of the Scott Paper Company declared the regular quarterly dividend of $1.12½ per share on the company's outstanding $4.50 cumulative preferred shares, and the regular quarterly dividend of $1.00 per share on the company's outstanding $4.00 cumulative preferred shares, both such dividends to be payable May 1, 1943, to shareholders of record at the close of business April 20, 1943.

Hawthorne Co. Makes Good Report

From a volume standpoint, the Hawthorne Paper Company reached a peak in 1942, President George H. Gerpheide said at the annual meeting of the company's stockholders.

Mr. Gerpheide said the year, in volume, was the best in the company's history, and declared he expected the year 1943 to be "another active period."

A large part of Hawthorne's paper products are going into war uses of one kind or another, he said, and with the government demanding increased quantities of paper in the prosecution of the war, "we expect to be very busy for the duration at least."

Stockholders re-elected all directors at their annual meeting, and the directors re-named all present officers.

Watervliet Co. Has Good Year

Both the book mill and coating mill of the Watervliet Paper Company operated at better than 80% of capacity durng 1942, stockholders learned Wednesday afternoon at their annual meeting in the Park-American Hotel.

The report to stockholders showed that book mill operations in 1942 were 87.6% of capacity, while those in the coating mill were 81.7%.

Stockholders voted commendation to the officers and directors for the company's showing during the year, and re-elected all directors. The directors, at their meeting which followed, re-elected all officers.

Oxford Co. Votes Dividend

Directors of Oxford Paper Company have declared the regular quarterly dividend of $1.25 a share on the preference stock, according to Hugh J. Chisholm, president. The dividend is payable March 1 to holders of record February 15.

Consolidated Paper Nets $1.42

The Consolidated Paper Company for 1942 reports a net profit of $1,063,509, equal to $1.42 a share, against net of $1,448,754, or $1.93 a share, in 1941.

CONSTRUCTION NEWS

Under limitations order L-41 all projects involving expenditures of more than $5,000 must be specifically approved by the War Productions Board. The status of projects reported here with under the provisions of the order is not known.—EDITOR.

Savannah, Ga.—The Union Bag and Paper Corporation, manufacturer of kraft wrapping and bag papers, has plans under way for new building at mill, to be equipped for handling tallol extraction, a by-product of the sulphite process used at the plant. Proposed to begin work at early date. No estimate of cost announced.

Chicago, Ill. — The Triangle Paper and Box Company, 122 West Kinzie street, manufacturer of paper boxes and containers, and other paper goods, has leased the three-story and basement building at 61 West Hubbard street for a term of years, and will occupy at early date. It is proposed to provide increased facilities at new location.

South Attleboro, Mass. — The Rhode Island Cardboard Company, manufacturer of paper board stocks, is said to have plans maturing for proposed rebuilding of local storage plant, recently damaged by fire, as previously noted in these columns.

Kalamazoo, Mich.—The Sutherland Paper Company, manufacturer of carton and paper dish stocks, mill blanks, etc., is running at a maximum capacity, as permitted by recent paper limitation order, at its converting plant, with a heavy backlog of orders. It is said that close to 90 per cent of output is being used by the food products industry, with majority of remainder by the tobacco and personal hygiene products branches of trade. It is expected to hold to present operating basis for an indefinite period. Company machine shop is now given over to the manufacture of certain war materials for Government, with employment of about 50 men in this department.

Brooklyn, N. Y.—The Biltmore Tissue Manufacturing Company, Inc., recently organized with capital of $50,000, is planning early operation of a local converting plant, for the manufacture of a line of tissue specialties. New company is represented by Jacob H. Corn, 280 Broadway, New York, attorney.

Newton, Mass.—The Sherman Paper Products Corporation, Oak street, Newton Upper Falls, manufacturer of paper goods, is completing construction of an addition to boiler house at mill, and will place unit in service at early date. It will be used for general expansion, including coal storage facilities. No estimate of cost has been announced. Peter F. Rossi Company, 820 Massachusetts avenue, Arlington, Mass., is general contractor.

Toledo, Ohio—Owens-Illinois Glass Company, Ohio Building, has perfected a new closure cap for vacuum-packed glass jars of coffee. It is made primarily of paper, under a special process developed by the company research department, and will be placed in commercial production at once, under a heavy manufacturing schedule.

St. Paul, Minn. — The Minnesota Mining and Manufacturing Company, 900 Farquier avenue, manufacturer of sand paper and other abrasive paper stocks, cellulose tape, etc., has work under way on improvements in plant, recently referred to in these columns, including installation of new electric motors, controls and auxiliary equipment. E. M. Johnson is vice-president and chief engineer, in charge.

New York, N. Y. — The Taggart Corporation, 230 Park avenue, has developed a number of new multi-wall paper bags for the packaging of products for war service, heretofore using metal and other similar containers, and a large part of output at company converting plants is now being given over to the new bag units, under heavy production schedules.

George Boschen Joins Army

George R. Boschen, assistant to Thomas J. Burke, secretary-treasurer of the Sulphite Paper Manufacturers Association, resigned his position at the end of January to enter the armed services. Mr. Boschen had just completed nine years' service, having joined the staff of the Sulphite Paper Manufacturers Association in January 1934.

The members of the staff of the association and other friends in the paper industry's associations located in the Chanin Building presented George with a wrist watch, suitably engraved, at a dinner given in his behalf which was attended by twenty of his associates.

Mr. Boschen was the second member of the Sulphite Association staff to go into military service, Ted Tegtmyer having resigned in October last year for the same purpose.

Boston Firms Hold Sales Meetings

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., February 8, 1943—Representatives of the American Writing Paper Corporation, including James H. Sweet, sales manager; W. J. Norton, treasurer; Shell Bradley, of the Promotion Department, and Ralph L. Day, manager of the Boston office, recently held sales meetings with four firms of paper merchants, with the idea of acquainting the sales forces with their products, discussing their lines generally, as well as their advertising plans for 1943. The firms at whole offices the meetings were held were Carter Rice & Co., Corporation; John Carter & Co., Inc.; Century Paper Company, Inc., and Arnold-Roberts Company.

Perry W. Lesh Heads Community Fund

INDIANAPOLIS, Ind., February 8, 1943—Perry W. Lesh, head of the C. P. Lesh Paper Company here, has been named president of the Indianapolis Community Fund by the board of directors. Mr. Lesh has served as first vice president the last two years. In the early days of the organization, Mr. Lesh served as a team worker, captain and employee-division chairman in the annual drives and in 1939 was general chairman. He is active in the work of the American Legion and the United War Fund.

To Speak at NPTA Meeting

Arthur Chamberlain, secretary of the National Paper Trade Association, says "We are highly gratified to announce that Senator James E. Murray of Montana, Chairman of the Senate Small Business Committee, whose program and activities have been so prominently before the public, has accepted our invitation to address the opening session of our Annual Convention and War Conference Monday afternoon, February 15. Senator Murray is also a member of the Senate Committee on Education and Labor.

"On the same occasion, we are equally fortunate to have A. D. Whiteside, President of Dun & Bradstreet, a man of the broadest outlook and unquestioned industrial leadership, whose views command the respect of the entire country. Both Senator Murray and Mr. Whiteside are recognized for their sympathetic intelligence with respect to the essential functions of distributors.

"At another session, on Tuesday, February 16, devoted specifically to the position and obligations of the Paper Trade in the War Effort, the guest speaker will be Col. C. M. Piper, a member of the Industry Advisory Council (Policy Committee) of the Office of Price Administration.

"The above announcements insure a program of extraordinary value and provide a great privilege for our members."

Bags in War Effort

Grocery bags now have become vocal under the impact of total war. The Union Bag and Paper Corporation has enlisted hundreds of millions of its kraft grocery bags to carry government approved messages from wartime agencies into millions of American kitchens.

"Victory Slogan Bags," color-printed with illustrated wartime messages, are a new voice for important projects in which the government needs cooperation from people on the home front, particularly housewives.

Union Bag and Paper Corporation expects to print up to 10 per cent of its grocery bag production with government campaign slogans. The company is paying the bill as its contribution to war advertising. Retailers throughout the United States are already stuffing their customers' purchases into slogan bags.

Recently, scores of prominent people in Washington and New York were photographed by news cameramen, while carrying their groceries home from their local food stores in victory slogan bags. Among the Washingtonians were Mrs. Henry A. Wallace, wife of the Vice-President; Mrs. Lewis B. Hershey, wife of Brig. Gen. Lewis B. Hershey; Mrs. Claude Wickard, wife of the Secretary of Agriculture, and Mrs. Paul V. McNutt.

New Yorkers included Mrs. Wendell Willkie, wife of the Republican political leader; Lily Pons, Metropolitan Opera star; Ilka Chase of stage and screen fame; Fannie Hurst, celebrated author, and Ruby Elzy, singing star of "Porgy and Bess." Radio's famous "Quiz Kids" were photographed in Chicago. In addition the newspapers caught pictures of many of the "plain people" from all walks of life who were found shopping alongside the celebrities.

Many wholesalers, retailers and consumers have already expressed their approval and congratulated the company for its war contribution.

"Victory Slogan Bags," which come in three different sizes, are being offered to the trade by company salesmen at no extra cost.

Our complete selection of super-calender roll and embossing roll fillings includes the exact type to give you the best finishing results on your papers.

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger
EDITOR

Vol. 116 February 11, 1943 No. 6

COMING EVENTS IN PAPER INDUSTRY

American Paper and Pulp Association, Sixty-sixth Annual Convention and meeting, Waldorf-Astoria Hotel, New York, February 15-19.

Technical Association of the Pulp and Paper Industry, Convention, Commodore Hotel, New York, February 15-18.

National Paper Trade Association of the United States, Convention, Waldorf-Astoria Hotel, New York, February 15-18.

Salesmen's Association of the Paper Industry, Annual Meeting and Luncheon, Waldorf-Astoria Hotel, New York, Tuesday, February 16.

The New York Association Of Dealers In Paper Mills' Supplies, Annual Banquet, Commodore Hotel, New York, Tuesday, February 16.

Paper Club of New York, Annual Dinner and Entertainment, Waldorf-Astoria Hotel, New York, Wednesday, February 17.

Canadian Pulp and Paper Association, Thirteenth Annual Meeting, Mount Royal Hotel, Montreal, Que., Canada, January 27, 28 and 29.

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

American Pulp and Paper Mill Superintendents Association, Twenty-fourth Annual Convention, Commodore Hotel, New York, June 15-17.

THE BUDGET

The President's $109 billion budget has been severely criticized, not because of its unprecedented size but for its lack of clarity. It has been asserted by the Joint Committee on Reduction of Non-Essential Federal Expenditures, that the budget is misleading and "tells only part of the truth; that some non-war items are included as war expenditures," etc. The exact amount of the budget sent to Congress by the President is $108,903,047,923, of which $4,124,000,000 comprise non-war expenditures.

In its failure to recommend a positive wartime fiscal program and its indefiniteness on the prospect for further cuts in non-war expenditures, the message was disappointing, declares Harley L. Lutz, professor of public finance, Princeton University, in the January issue of The Tax Review, published by Tax Foundation, 30 Rockefeller plaza, New York. "The President admits," Mr. Lutz goes on to say, "that some persons may consider his program fantastic. In one sense it is, for he proposes an expenditure of $97 billion for war purposes, but he also says that despite this war program civilians can be supplied with an average of about $500 worth of goods and services at the same time. The catch in this proposition may be the value to be set on the services, but taking the figures at face value, they mean civilian consumption of some $65 billion, at $500 per head, plus war production of $97 billion, or a total value of national product in the fiscal year 1944 of approximately $162 billion. Since all of this assumes "only a small rise in prices" it points to a total national product of not less than $160 billion in terms of present prices. This figure is so far above all previous records and previous experience in production that some skepticism is pardonable, if not warranted."

Continuing his analysis, Mr. Lutz points out that "Achievement of the more or less fantastic production goal envisaged in the message will involve not only drastic mobilization of labor power—men and women—but also a severe control of civilian production. The $500 average of goods and services to be available for civilian consumption is said to represent a reduction of about 25% below their record civilian consumption level of the year 1941. The manner of accomplishing this result is the planning for more of essential and less of non-essential goods. 'Production and distribution of goods should be simplified and standardized; unnecessary costs and frills should be eliminated.' In this connection the message refers with approval to the stabilization program, although the confused condition of OPA has been evident for some time and the first important action of the economic stabilization director, the salary limitation order was only a futile gesture as an inflation control measure. An example of what has been happening in OPA is the recent admission that the quantity of fuel oil ration coupons issued was unknown."

In commenting on the non-war aspect of federal economy, Mr. Lutz says in part: "The inherent and inevitable wastefulness and costliness of war have engendered a belief that any critical consideration of war spending is necessarily an impediment to victory. The fact would appear to be otherwise. Wasteful war spending, whether a result of profligate temperament and inexperience or of defective and inadequate programming of requirements, is a definite impediment to victory. . . . The recommendation that taxation should be simplified and put on a pay-as-you-go basis is late, very late, but welcome even so as an indication of the eventual triumph of good sense over bureaucratic resistance. It is no secret that Treasury opposition and indifference have been chiefly responsible for the delay in giving serious consideration to the suggestions that have been made looking toward these results."

In reference to debt and national solvency, Mr Lutz states in part: "The public debt is estimated to stand at $135 billion by June 30, 1943 and a year later it will have mounted to $210 billion under existing tax laws. Obviously the present statutory limit of $125 billion must be raised and it may as well be abolished completely, although the President suggests

an extension. He adds: "To do this is sound, for such a debt can and will be repaid. The Nation is soundly solvent.' National solvency can be construed in different ways. Long before the war ends the federal debt will exceed the total value of the real estate in the country. No government ever need be insolvent in the sense of being unable to meet an obligation on the due date, for it can always print paper money and compel its acceptance in settlement. The meaning which the average person is likely to read into the statement quoted above is that the debt can and will be repaid by the application of surplus revenues to debt redemption. In this view, national solvency implies both the willingness and the capacity to provide, through post-war taxation, a revenue surplus sufficient for this purpose. Such a view is the purest form of wishful thinking. . . . Finally, the budget message hints at the glad new world which was founded by the Atlantic Charter, swaddled by the Beveridge Commission, and is to be paid for by Uncle Sam. 'Freedom from want for everybody, everywhere, is no longer a Utopian dream.' But it is still a pipe dream and will be until there can elapse a long and dreary process of transforming the habits, customs, taboos and prejudices of the earth's teeming millions."

Boston Reports Paper Stock Quiet

BOSTON, Mass., February 8, 1943—Due to conditions, paper stock is quiet, an unusual situation at this time of the year. Old Corrugated Containers are selling at 82½ cents.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1943		Corresponding Weeks—1942	
December 26, '42, Holiday Week	63.3	December 27, '41	79.3
January 3	73.6	January 3	102.2
January 9	86.8	January 10	103.5
January 16	88.0	January 17	105.0
January 23	88.0	January 24	105.0
January 30	*87.2*	January 31	104.3

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1942	104.5	103.9	102.9	100.4	95.3	87.4	75.8
1943	*87.9*	....	....	....	....	....	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1943	80.8	82.8	90.6	86.8	80.1	90.5
1943	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1936	1937	1938	1939	1940	1941	1942	1943
Year to Date..	75.5	89.5	63.2	76.0	89.5	85.6	104.5	*87.9*
Year Average.	80.4	79.8	71.5	83.4	85.6	97.4	90.5	....

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS †

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	*86*	..	..	..	..	..	..	..	..	..	..	..	..

Week ending Dec. 26, 1942—72
Week ending Jan. 2, 1943—62
Week ending Jan. 9, 1943—82
Week ending Jan. 16, 1943—88
Week ending Jan. 23, 1943—88
Week ending Jan. 30, 1943—*88*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

EXPORTERS
OF AMERICAN PULP

TO
BRITAIN
SOUTH AMERICA
AND ALL WORLD MARKETS

LYDDON
& COMPANY
(AMERICA) INC.

51 EAST 42ND STREET
NEW YORK CITY

What are Your Wartime

ADHESIVE and STARCH PROBLEMS

. . . in Manufacturing?

. . . in Converting?

. . . in Packaging and Sealing?

Visit our booth at the Commodore during the Paper Convention, February 15-18, and see our display of latest developments in wartime paper packages and containers.

Our staff of paper and adhesive technicians will be available there at all times during exhibit hours . . . and also in our suite at the Waldorf-Astoria.

They will be glad to show you results in the form of finished products.

NATIONAL ADHESIVES

DIVISION OF

NATIONAL STARCH PRODUCTS INC.

820 Greenwich Street, New York

Chicago—Boston—Philadelphia—San Francisco—and All Principal Cities

Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY

Edited by R. G. Macdonald, Secretary

Fluorescence of the Extractives of Wood*

By William W. Marteny[1]

Abstract

The location of extractives in black spruce, western hemlock, and loblolly pine has been determined by the application of fluorescence analysis. The ether-soluble fluorescent extractives are found in the wood rays, resin ducts, and pits, depending upon the species investigated. Similarly, the alcohol-soluble substances occur in resin ducts, tracheid walls, and wood rays. The water-soluble fluorescent extractives are distributed throughout all the cell walls.

An instrument has been designed to measure accurately and objectively the spectral character of the fluorescence of extracted wood specimens and of the extracted materials. After the removal of fluorescent extractive materials from wood sections by successive application of various solvents, the fluorescence of the sections was characteristic for each of the woods studied, but marked differences occurred among the three specimens. It has not been possible to interpret the fluorescence curves obtained in terms of specific substances removed by the solvents.

The extractive portions of loblolly pine were separated into their component substances or groups of substances by the usual chemical methods. Each fraction obtained in the procedure displayed a typical fluorescence character, both in intensity and spectral distribution. However, the fluorescence characteristics were not sufficiently distinct to make practical their application to the analysis of complex mixtures. For binary mixtures it was shown that the observed fluorescence curve can be closely approximated from a consideration of the fluorescence curves and of the ultraviolet absorption spectra of the individual substances.

Although much progress has been made recently in the field of fluorescence analysis, most of the data reported have been of a qualitative nature based upon subjective observations. Fluorescence methods have been applied to wood in a number of cases, but their possible utility has not been clearly defined. The present study was undertaken to examine more carefully the application of fluorescence methods to the extractives of wood, and to develop an apparatus capable of measuring objectively and quantitatively the intensity and spectral distribution of the fluorescent light.

Since most wood extractives possess the property of fluorescing when irradiated by ultraviolet light, fluorescence analysis offers a means for determining their location in the wood structure. The method is particularly applicable because minute structure can be revealed and differentiated without chemical or physical alteration of the specimen and while the substances investigated are in their original location in the wood. Application of quantitative methods for measurement of fluorescence also offers the possibility of evaluating the composition of wood after certain selective extractions and of the materials removed by the solvents.

Although the color and intensity of fluorescence are fairly characteristic for each substance, one important limitation of the method must be noted. The presence of small quantities of impurities may drastically alter the fluorescence of the chief constituent and, in all cases of mixtures, neither the intensity nor the spectral distribution of the fluorescent light from the corresponding values of the individual components is additive. Although this property is frequently most useful in detecting traces of extraneous materials in relatively pure substances, it constitutes a decided restriction in general application of the method when dealing with mixtures.

In a broad sense, fluorescence comprises the reemission of absorbed radiation during the period of excitation and over a range of wavelengths longer than those absorbed, without reference to specific wavelengths of either absorbed or emitted radiation. However, in the customary usage which is maintained in this paper, excitation is obtained from ultraviolet light in the range of 200 to 400 mμ and the resulting fluorescence is considered to be only that which appears within the range of the visible spectrum—400 to 700 mμ.

Historical Survey

Although the application of fluorescence methods to wood has been rather limited, Vodrázka *(1)* has stated that Gappelsröder as early as 1867 studied the fluorescence properties of wood extracts. The review of Danckwortt *(2)* noted the application of fluorescence to identification of wood species. Different fluorescent colors were observed in springwood and summerwood, in sapwood and heartwood, and various types of cells were differentiated. Radley and Grant *(3)* described experiments of Eichler *(4)* in which thin sections were treated with hydrofluoric acid to remove the cellulose and leave the lignin in its original structural form. In sections thus prepared, the differences in springwood and summerwood under

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Statler, Boston, Mass., Sept. 29-Oct. 1, 1942.
A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1941. This work was carried out under the direction of B. L. Browning.
[1] Member TAPPI; Chemist, Northwest Paper Company, Cloquet, Minn.

ultraviolet light were greater than for freshly cut samples. The fluorescence of lignin in the middle lamella and in the secondary wall of beech was attributed to impurities.

Baldwin *(5)* determined by fluorescence analysis, supplemented by staining techniques, that the extractives of black spruce wood are located in the resin ducts with their surrounding epithelial cells, in the rays and in the simple and bordered pits. By application of solvents, the extractives were differentiated into two classes, one fluorescing blue and soluble in ether, the other fluorescing yellow and soluble in dioxane and alcohol-benzene. The qualitative spectral characteristics of the various elements of wood were determined by taking photomicrographs through judiciously chosen light filters.

Certain of the wood extractives are known to fluoresce, but knowledge of the components present in extractives and of the fluorescence of typical components is fragmentary. The fluorescence of cell sap is attributed to glycosides and tannins *(2, 6)*. A yellow fluorescence of tannin extracts has been observed by Meunier and Bonnet *(1)*. Resin oils and rosin fluoresce strong bluish-white and American turpentine violet-blue *(3)*. Wislicenus *(7)* reported that finely divided rosin obtained from old dry pinewood fluoresced yellow, whereas the freshly recovered rosin had a blue fluorescence. Similarly, large and unoxidized pieces fluoresced blue and small pieces, in which oxidation would proceed more readily, fluoresced with a yellow color.

In addition to change in character of fluorescence of certain constituents upon oxidation, the presence of ions and the hydrogen-ion concentration of solutions have a decided effect as shown by the intensification of fluorescence in water extracts of wood and the transition of the fluorescence color of wood on treatment with ammonia *(4, 8)*. The decrease in intensity of the fluorescence of chlorophyll with increased time of exposure indicates that fluorescing materials may be subject to photochemical action *(9)*.

The Measurement of Fluorescence

Almost all reported observations of the color and intensity of fluorescence have been based upon visual observation. The results are subjective and of qualitative nature only. In addition, unless the exciting radiation is entirely free of near ultraviolet and blue light, the reflected violet and blue light is likely to be confused with fluorescence of those colors.

Improved results have been obtained by the use of visual photometers using filters, and additional precision is obtained by application of photoelectric photometers as used by Toussaint *(10)* and others. Visual spectrophotometers have been used to determine the intensity of fluorescence at various wavelengths, from which a curve giving the color of light and its relative intensity may be plotted. Chevallier and Dubouloz *(11, 12)* used a photocell and triode amplifier to measure the intensity of fluorescence of sodium salicylate. Zecheile, Hogness, and Young *(13)* determined the fluorescence of chlorophyll in ether with equipment consisting of a monochromator, photocell, electrometer, and a high resistance leak; a considerable sensitivity was obtained.

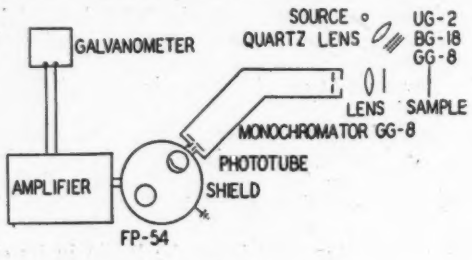


FIG. 1
Photoelectric Spectrophotometer

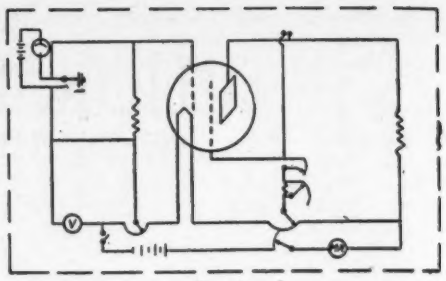


FIG. 2
Diagrammatic Sketch of the Amplifier

For the present work, a photoelectric spectrophotometer of high sensitivity was required because of the low intensity of the fluorescent light, particularly after splitting of the light beam by a monochromator. The requisite sensitivity and satisfactory operating characteristics were obtained with an instrument assembled from a Bausch and Lomb quartz monochromator, a General Electric direct current amplifier using a Pliotron FP-54 tube, a Visitron 59-D gas-filled photoelectric tube, a Leeds and Northrup type P galvanometer, a short focal length quartz lens, a glass lens, and several light filters (Jena UG-2, Jena BG-18, and Jena GG-8). The source of ultraviolet light for the study was a General Electric H-3 mercury arc lamp with the glass envelope removed above the base.

The arrangement of the instrument is shown in Fig. 1. The light from the source was passed through two light filters (a Jena UG-2 and a Jena BG-18) to remove most of the visible light and condensed to form a sharp image of the arc on the sample. This combination of filters is best suited for the result described, because the UG-2 has a high transmission between 290 and 400 mμ, with a small transmission between 650 and 700 mμ, and the BG-18 passes light from 325 to 650 mμ. The image of the fluorescent region of the sample was formed on the slit of the monochromator by the use of the glass lens. Ultraviolet light reflected from the sample was removed from the beam entering the monochromator by a Jena GG-8 ultraviolet stopping filter placed before the lens.

The photoelectric tube, the detector tube, and the high resistance grid bias (10,000 megohms) were placed in a metal shield capable of being evacuated in order to eliminate the effect of moisture on the tube and the resistor. A small Pyrex-glass window was built into the side of the shield so that the monochromatized light would fall on the sensitive surface of the phototube. The amplified photocurrents were measured with the galvanometer. Figure 2 is a schematic diagram of the amplifier circuit as proposed by Dubridge *(14)*.

The instrument was calibrated for sensitivity at various wavelengths by measurement of galvanometer

deflections obtained when a tungsten lamp operated at 5.9 volts was used as a standard source of known spectral distribution; this corresponded to a color temperature of 3000° K. A sensitivity constant of the instrument at each of a number of selected wavelengths is calculated as the ratio of the galvanometer deflection to the relative intensity of the standard source for any definite wavelength. In analyzing fluorescence of unknown specimens, the relative intensity of fluorescence at each wavelength chosen was determined by multiplying the galvanometer deflection by the reciprocal of the sensitivity constant.

The Jena UG-2 and BG-18 filters did not remove all visible light from the exciting radiation, and it was necessary to determine the contribution of the reflected visible light to the measured fluorescence. This was accomplished for each individual measurement by taking a second reading with an ultraviolet stopping filter (Jena GG-8) in the incident beam, permitting only visible light to pass. The amount of visible light absorbed by the GG-8 filter at each wavelength used was determined and proper corrections made therefor. The difference between the deflection obtained when the sample was exposed to ultraviolet light and the corrected deflection (representing the contribution of the reflected visible light) was considered as the deflection caused by fluorescence alone, and was converted into a value of relative intensity.

Materials Used

Woods

Samples of black spruce *(Picea mariana* (Mill.) BSP), western hemlock *(Tsuga heterophylla* (Rafn.) Sarg.), and loblolly pine *(Pinus taeda* L.), were chosen as representative of commonly pulped conifers. Logs of those woods approximately 6, 24, and 5 inches in diameter, respectively, were cut shortly before being used in the investigation to permit a minimum of seasoning.

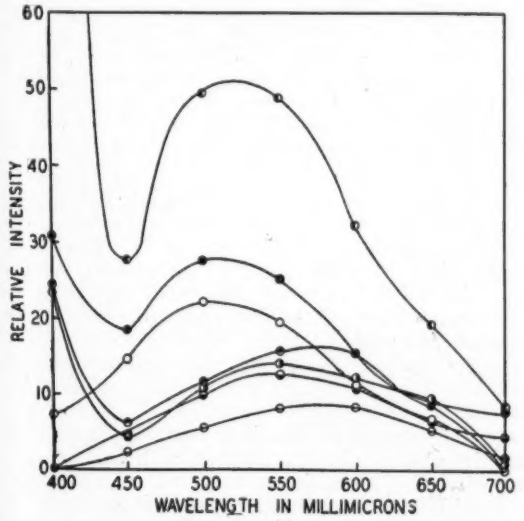


Fig. 3

Relative Intensities of the Fluorescence of Spruce Sapwood Extracted with Various Solvents

○	Unextracted	○	1% acetic acid
●	Ether	●	5% hydrochloric acid
◐	Alcohol-benzene	◐	5% sodium hydroxide
◑	Hot water		

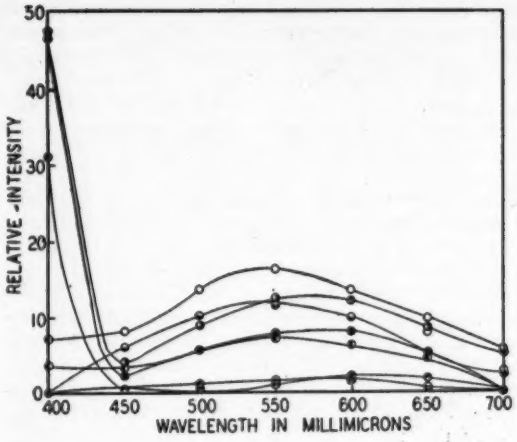


Fig. 4

Relative Intensities of the Fluorescence of Western Hemlock Sapwood Extracted with Various Solvents

○	Unextracted	○	1% acetic acid
●	Ether	●	5% hydrochloric acid
◐	Alcohol-benzene	◐	5% sodium hydroxide
◑	Water		

Solvents

The ethyl ether was purified by refluxing commercial absolute ether with sodium for several hours and distilling. Ethyl alcohol (95%) was purified by fractional distillation, and the distillate was found to give no fluorescence. The distilled water used had only a negligible fluorescence.

Fluorescence of Wood Sections

The fluorescence of wood sections of black spruce, western hemlock, and loblolly pine was examined for intensity and spectral character. Similar sections were examined after successive extractions with a number of selected solvents.

Spruce

The fluorescence of black spruce sapwood before extraction and after each stage in successive extractions is shown in Fig. 3. The fluorescence of unextracted heartwood is slightly more intense than that of sapwood but has the same general shape. Extraction with ether markedly increases the intensity in the violet for both samples. When the sapwood is extracted with alcohol-benzene, the intensity of fluorescence increases considerably, especially in the violet. Extraction of the heartwood with alcohol increases the intensity only slightly but removes the intense violet fluorescence. When both samples were extracted with 1% acetic acid, 5% hydrochloric acid, and 5% sodium hydroxide, they fluoresced less intensely between 450 and 700 mμ. The fluorescence of the sapwood was intensified in the violet after extraction with water and hydrochloric acid, whereas only hydrochloric acid causes this effect in the heartwood.

Western Hemlock

The fluorescence of western hemlock sapwood is shown in Fig. 4. Both the sapwood and heartwood proved to be less fluorescent than spruce. The changes in fluorescence between 450 and 700mμ during the series of extractions were less than for spruce. Extraction of the heartwood summerwood with ether caused an extreme intensification of the fluorescence

in the violet, but otherwise this portion of the wood was characterized by a low intensity of fluorescence at 400 mμ, whereas the springwood was characterized by a slight increase in intensity at the same wavelength. In contrast to the behavior of the heartwood, the fluorescence of the sapwood was intensified in the violet by extraction with water and hydrochloric acid.

LOBLOLLY PINE

This wood specimen consisted entirely of sapwood, the fluorescence characteristics of which are shown in Fig. 5. The behavior was entirely different from that of the other two species. The unextracted wood fluoresced intensely in the violet. When it was extracted with ether and alcohol, the intensity of fluorescence at 400 mμ was decreased, though little change resulted in other portions of the spectrum. Water and solution of acids induced a high intensity at 400 mμ. A second maximum was introduced at 600 mμ by extraction of the wood with acetic acid. Final extraction with sodium hydroxide left it practically nonfluorescent.

EFFECT OF VARIOUS CONDITIONS ON FLUORESCENCE

Because of the interest (both practical and theoretical) in the effect of aging the wood, it was desirable to determine the effect of aging on the fluorescence of wood. Sections were prepared from spruce and hemlock sticks which had been stored in the laboratory for seven months and of loblolly pine which had been similarly stored for four months. In comparison with unaged samples, the effect of aging on fluorescence was a marked decrease in intensity at all wavelengths for the three woods.

With the thought that, particularly in the case of loblolly pine, the high fluorescence in the violet of the unextracted wood and of the wood after extraction with aqueous solvents in contrast to decreased fluorescence after extraction with alcohol and ether might be the result of some dehydration effect, this possibility was further investigated. A section was dehydrated by extraction with absolute ethyl alcohol over anhydrous sodium sulphate in a Soxhlet extractor for one hour, hydrated by boiling in water for 20 minutes, and again dehydrated by a second extraction with absolute alcohol. These successive treatments resulted in a progressive decrease in intensity at 400 mμ so that, although hydration of the wood may be a factor in the intensity of fluorescence in the violet, it is not the cause of the effects noted after extraction with aqueous solvents.

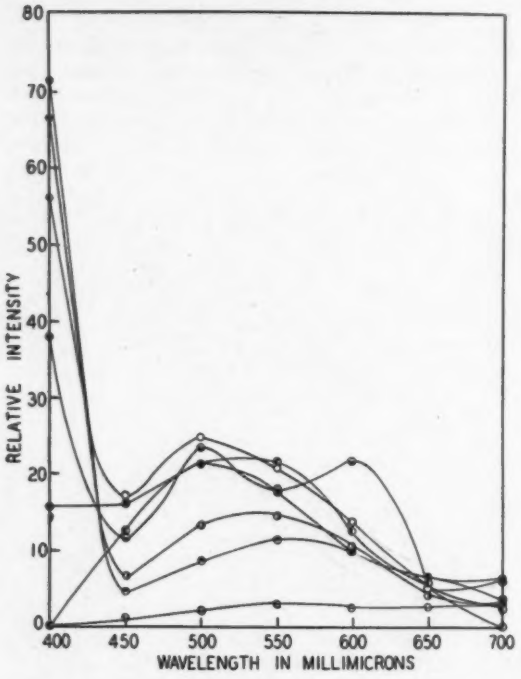


FIG. 5

Relative Intensities of the Fluorescence of Loblolly Pine Sapwood Extracted with Various Solvents

○ Unextracted
● Ether
● Alcohol
● Water
● 1% acetic acid
● 5% hydrochloric acid
● 5% sodium hydroxide

LOCATION OF EXTRACTIVES AS DETERMINED BY FLUORESCENCE

The location of fluorescent extractives in the three woods examined was determined by microscopic examination, supplemented by photomicrographs of the wood sections in tangential, cross, and radial sections before and after each extraction. A summary of the observations is given in Table I.

TABLE I.—LOCATION OF EXTRACTIVES IN WOOD

Wood	Ether Soluble	Alcohol Soluble	Water Soluble
Black spruce sapwood	Wood rays Resin ducts Pits	Resin ducts	All cell walls
Western hemlock	Wood rays	Tracheid walls	All cell walls
Loblolly pine	Resin ducts	Tracheid walls Resin ducts Wood rays	All cell walls

Fluorescence of the Extractive Fractions of Loblolly Pine

Sawdust passing a 60-mesh screen was extracted without preliminary drying for four hours with ethyl ether in a Soxhlet extractor. A control test in which another portion of sawdust was similarly extracted and then subjected to a second four-hour extraction with a fresh lot of dry ether showed that, of the total ether-soluble material, 99.4% was extracted in the first four hours and that the ether extraction apparently was not hindered by the use of moist wood. The ether-extracted sawdust was successively extracted for eight hours with ethyl alcohol in a Soxhlet extractor, and for three hours with boiling water.

The ether extract was separated into its components according to the procedure of Kurth *(15)*. The extract was concentrated, saponified with *N* alcoholic potassium hydroxide, and separated into an unsaponifiable fraction and a saponified acid fraction. The unsaponifiable material was treated with an alcoholic solution of digitonin to separate the phytosterols from the resenes. The phytosterol-digitonin complex was decomposed with acetic anhydride and the phytosterols crystallized from alcohol. The saponified acids were separated into fatty and resin acid fractions by preferential esterification with boiling absolute ethyl alcohol in the presence of sulphuric acid. The oxidized acids were separated from the ether solution of the fatty acids by addition of petroleum ether. The remaining nonoxidized fatty acids were separated into saturated and unsaturated acid fractions by the lead salt-ether method.

The alcohol extract was further fractionated by the procedure of Kurth. After concentration of the

extract under reduced pressure, water was added to precipitate the phlobaphene fraction, in which any native lignin would appear. Tannins and pigments present in the water solution were extracted with ethyl acetate. The remaining water-soluble material was recovered by concentration. The phlobaphene fraction was dissolved in purified dioxane and, after removal of water, was precipitated into ether. It was purified by repeated reprecipitations from dioxane into ether until the fluorescence attained a constant value. The methoxyl content of this material remained constant at 13.8% after the first precipitation from dioxane into ether. This value is to be compared with the methoxyl content of spruce native lignin, which has a methoxyl content of 14.8%. The indication is that the phlobaphene fraction of loblolly pine consists largely or wholly of native lignin. The ultraviolet absorption spectra of this preparation shows the same maximum and minimum as do other preparations of native lignin.

The water extract was concentrated, filtered, and a carbohydrate fraction *A* precipitated by addition of four volumes of alcohol. The fraction was purified by reprecipitation from water solution. The alcohol-soluble portion of the water extract was recovered by concentration.

Since the fluorescence is a sensitive indication of the presence of impurities, the fractions were, in each case, purified to constant fluorescence; the changes during the purification steps offer a logical control of the purity attained. For example, in purification of the highly fluorescent resenes from almost wholly nonfluorescent phytosterols, it was observed that a small quantity of phytosterols considerably decreases the fluorescence of resenes, but that large quantities are without pronounced effect.

The fluorescence of the total ether extract and of the fractions isolated from it are shown in Fig. 6. Although each substance possesses distinctive spectral characteristics as quantitatively defined by the curves, the maxima, intensity, and distribution are so similar as to make their application to examination of mixtures impractical.

The fluorescence of the alcohol extract and of its components is given in Fig. 7. In comparison with the ether extract, the alcohol-soluble material is less intense in fluorescence and, although the maximum fluorescence is noted at 500 mμ in both cases, the distribution is such that the dominant color of the alcohol extract is in the direction of higher wavelengths.

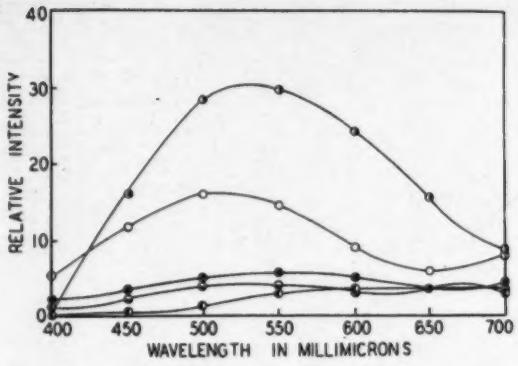


FIG. 7

Relative Intensities of the Fluorescence of the Alcohol Extract

○ Total extract--bright portion ◐ Water-soluble material
◉ Total extract--dark portion ◑ Tannins and pigments
◉ Native lignin

Fig. 8 shows the spectral distribution of the fluorescence of the water extract and of its component fractions. The intensity of the total extract is very low, and much smaller than that of any of the component portions isolated. The crude fraction *A* showed a high fluorescence at 400 mμ, apparently due to the presence of an unidentified impurity which fluoresced so intensely at 400 mμ that its relative intensity was 164. When this impurity was removed, the fluorescence of fraction *A* at 400 mμ completely disappeared. Evidently the effect of this impurity did not appear in the case of the total extract, because of some difference in the relative quantities of the constituents present.

When an attempt is made to interpret the fluorescence curves of mixtures, the first difficulty encountered is that resulting from the enhancement or depression of fluorescence of the main constituent by small quantities of impurities. When this difficulty does not exist because of the nature of materials present, fluorescence curves of mixtures are still not additive from those of the substances present. However, it should be possible to calculate the fluorescence curves of mixtures from the individual absorption

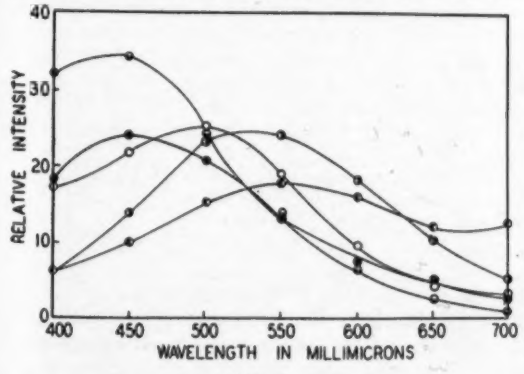


FIG. 6

Relative Intensities of the Fluorescence of the Ether Extractives

○ Total extract ◐ Oxidized fatty acids
◑ Unsaturated fatty acids ◐ Resin acids
◉ Resenes

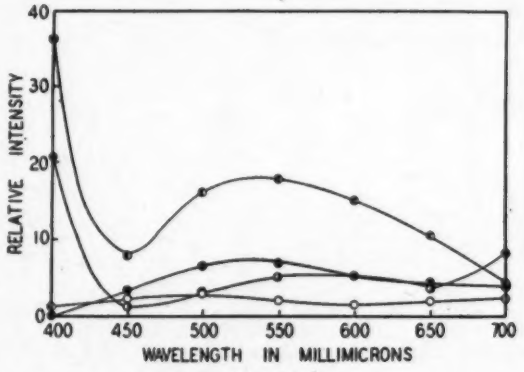


FIG. 8

Relative Intensities of the Fluorescence of the Water Extract

○ Total extract ◐ Water fraction B
◉ Water fraction A ◑ Alcohol soluble

TABLE II.—RELATIVE INTENSITIES OF FLUORESCENCE OF MIXTURES

	Ether Extract				Alcohol Extract			
	33.2% Resin Acids, 66.8% Unsaturated Fatty Acids		2% Oxidized Fatty Acids, 98% Unsaturated Fatty Acids		73.5% Alcohol Extract—Water Soluble, 26.5% Tannins and Pigments		81.1% Alcohol Extract—Water Soluble, 18.9% Native Lignin	
Wavelength mμ	Observed	Calculated	Observed	Calculated	Observed	Calculated	Observed	Calculated
400	6.54	9.67	8.31	8.12	0	0.96	0	0
450	15.4	17.0	23.6	19.8	2.86	5.07	3.71	3.25
500	17.5	19.03	25.4	24.34	5.80	9.11	5.51	6.13
550	14.1	16.32	17.9	17.4	8.33	9.28	7.89	7.55
600	8.55	12.12	10.6	10.3	5.32	7.43	5.32	7.13
650	5.44	8.23	6.40	5.21	3.40	5.96	3.86	5.53
700	1.17	7.98	3.04	2.56	0.70	4.57	2.34	3.87

curves and the ultraviolet absorption coefficients of the separate substances.

This method has been applied to a number of mixtures prepared from the purified fractions previously examined. Ultraviolet absorption spectra of the ether and alcohol extracts and of their components were first determined according to the procedure used by Glading *(16)*. The values obtained are shown in Figs. 9 and 10. For purposes of calculation, the absorption was considered only for the dominant wavelength of the source—360 mμ. This is not strictly correct, as the absorption over the entire wavelength of the source should be included, but for simplicity the procedure employed leads to a useful approximation. The relationship ck = amount of energy absorbed (where c is the percentage of one component and k is the absorption coefficient of that component) was used to determine the fraction of total energy absorbed by one constituent. This fraction then indicates the contribution of that component to the fluorescence of

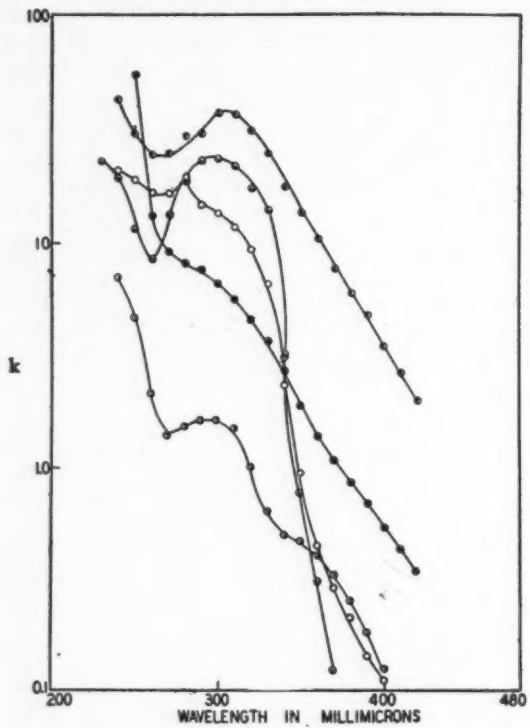


FIG. 9

Absorption Spectra of Ether-Soluble Material

○ Total extract
● Resin acids
◐ Oxidized fatty acids
◑ Resenes
◔ Unsaturated fatty acids

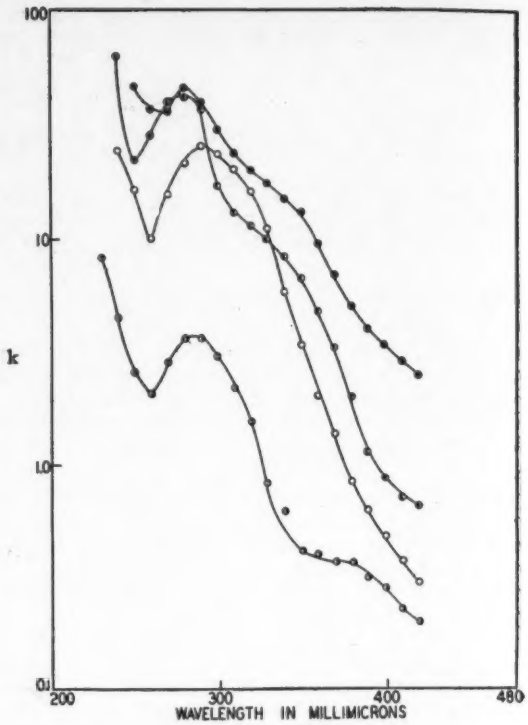


FIG. 10

Absorption Spectra of Alcohol-Soluble Material

○ Total extract
● Native lignin
◑ Tannins and pigments
◔ Water-soluble portion

mixtures. By adding the contribution of each component, it is possible to obtain the fluorescence spectrum of the mixture. In the portion of the visible spectrum, where the transmission of the components is low, the values obtained must be corrected for the absorption of the fluorescent energy.

The calculated fluorescence spectra of four mixtures of extractives are given in Table II and compared with observed values. In most cases, the agreement is good; in those cases which are not invalidated by trace effects, the procedure appears to lead to a sound evaluation of fluorescence spectra of mixtures.

Literature Cited

1. Vodrázka, O., *Z. wiss. Mikroskop.* 46:497-505 (1929).
2. Danckwortt, P. W. "Luminezenz-Analyse in filtrierten ultravioletten Licht." 3rd edition. Leipzig, Akademische Verlagsgesellschaft m. b. H., 1934. 190 p.
3. Radley, J. A., and Grant, Julius, "Fluorescence analysis in ultraviolet light." 3rd edition. New York, Van Nostrand, 1939. 424 p.
4. Eichler, Otto, *Cellulosechemie* 15:114-124 (1934); 16:1-7 (1935).
5. Baldwin, Paul C., Unpublished work. The Institute of Paper Chemistry, Appleton, Wis.
6. Nowak, A., *Z. angew. Chem.* 43:93 (1930).
7. Wislicenus, H., *Z. angew. Chem.* 41:1312-1316 (1928).
8. Kanehira, R., *J. Forestry* 19:736-739 (1921).
9. Kautsky, Hans, *Biochem. Z.* 274:423-451 (1934).
10. Toussaint, M. R., *Compt. Rend.* 193:933-934 (1931).
11. Chevallier, André, and Duboulos, Pierre, *Compt. rend.* 194:174-176 (1932).
12. Chevallier, André, and Duboulos, Pierre, *Compt. rend.* 194:452-454 (1932).
13. Zscheile, F. P., Jr., Hogness, T. R., and Young, T. F., *J. Phys. Chem.* 38:1-11 (1934).
14. Dubridge, Lee A., and Brown, Hart, *Rev. Sci. Instruments* 4:532-536 (1933).
15. Kurth, E. F., *Ind. Eng. Chem., Anal. Ed.* 11:203-205 (1939).
16. Glading, Ralph E., *Paper Trade J.* 111, no. 23:32-39 (Dec. 5, 1940).

New Electronic Variable-Speed Drive

By S. D. Fendley[1]

Abstract

A description of the electric variable-speed drive called the Thy-mo-trol is given, and the saving of time and materials as well as the various applications are described.

The experience and knowledge obtained from the use of thyratron-tube motor control for more than a decade have made possible the development by General Electric of a new electronic variable-speed drive with features and characteristics that make it ideally suited to a vast number of industrial applications. The versatility of this new drive which has already been applied extensively, is made possible by a new adjustable-voltage electronic control system, called Thy-mo-trol.

To preface the description of how this new control operates and what it consists of, it might be well to review briefly the operation and application of earlier types of electronic motor controls.

One of the earliest applications of electronic motor control was to the operation of an automatic lighting control installed about 1928. In this application, thyratron tubes were used to supply both the field and armature of a small motor to control its speed over a range of approximately 100 to 3600 r.p.m. Following this, many thyratron speed-control equipments were furnished for motors of various sizes and for many different applications.

The primary function of practically all of the original motor controls has been to adjust the speed of the motor. The other requirements such as starting, accelerating, etc., have been obtained largely through the use of various combinations of conventional control devices. A few equipments have been supplied for holding the motor speed constant, but in general their principal function has been to supply smooth, adjustable speed.

There are in service a relatively large number of thyratron motor-speed controls and there are many applications in industry for the use of such equipment.

Generally speaking, these equipments consist of an adjustable-voltage rectifier using thyratron tubes to supply the d-c. for the field and armature of the motor. By varying the output voltage of the tubes the speed of the motor can be changed. Some type of feed-back system is employed to do this, and it may be of either the mechanical or electrical type.

The phase-shift method is one of the most common ways to vary the output voltage of a thyratron tube. This employs the use of a resistance-reactance bridge which permits the phase relation of the grid voltage to be varied with respect to the anode voltage. By varying one of the elements in the bridge circuit, it is possible to change the phase displacement of the grid voltage with respect to the anode voltage from a condition where the two are completely in phase to the point where they are 180 degrees out of phase. When the two voltages are completely in phase, the tube will be turned full-on. When they are completely out of phase, the tube will be turned off completely and will not conduct any current. By varying the voltage relation between these limits, the tubes can be turned on to any desirable degree.

In a mechanical feed-back system, one of the elements in the phase-shifting bridge—usually the reactor—is varied mechanically to change the output of the tubes and thus regulate the speed of the controlled motor. Several arrangements of this type are shown in Fig. 1. In one of these, a loop of material being processed—this may be fabric, rubber sheeting, sheet steel, etc.,—is used to operate the movable core of the reactor which thus varies the speed of the motor in proportion to the rise and fall of the loop.

In some instances, where it is not practical to use a mechanical arrangement employing the reactor, the motor speed can be controlled through the use of a photoelectric arrangement as shown in the lower sketch in Fig. 1. A light beam is directed on the loop of material, and as the loop rises and falls it varies with amount of light falling on the phototube. This causes the motor speed to be increased or decreased through the use of the thyratron tubes in the same manner as with the reactor scheme.

The basic circuit for all equipments of this type employs two thyratron tubes to supply direct current to the motor field. The field voltage is varied by changing the position of the core in the reactor. Within the rating of available tubes, similar equipment can be used to control armature voltage.

Typical of the applications employing this type of control is the maintaining of constant tension in the reeling of wire, ranging from fine copper wire to large, heavy cable. Another similar application is that of synchronizing the speed of conveyors with that of a material in a plastic state as it emerges from an extruding machine, and for maintaining a fixed relationship between two or more conveyors which must handle the same material. Numerous applications of this type may be found in the rubber industry.

Where speed regulation is an essential factor, the

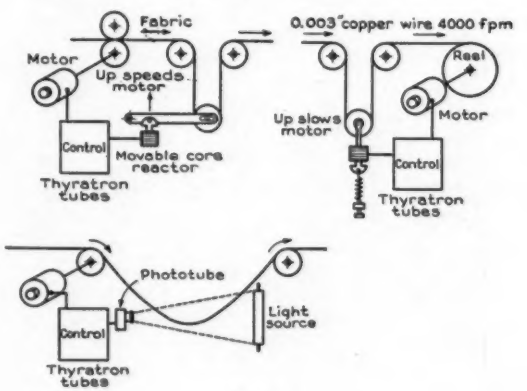


FIG. 1

Sketches Illustrating Various Mechanical-Feedback Arrangements as Employed with Earlier Electronic Motor Controls.

[1] Electronic Section, Industrial Control Division, General Electric Co., Schenectady, N. Y.

electrical feed-back arrangement, utilizing a pilot generator with a suitable circuit, makes it possible to hold the speed of a motor very nearly constant over a wide range of loads.

As in the mechanical arrangement, a full-wave rectifier is used, but a saturable reactor instead of a movable core reactor varies the output of the voltage on the motor.

Experience with the type of equipment just described has resulted in the development of the Thymo-trol system by General Electric. This control in combination with a suitable motor provides a variable-speed drive with features which are not ordinarily found in other conventional drives.

This electronically controlled motor drive was not developed with the idea that it can or will supplant the various other types of mechanical and electrical drives in use today, where such drives have the characteristics and provide all the features needed. The development has been carried on rather to evolve an electronic drive providing features not inherent in conventional drives where close speed regulation, smooth acceleration, precise control of speed, and other similar features are desirable. However, it is believed that this type of drive offers both the user and builder of machinery an equipment ideally suited to his needs.

General Description of Drive

The standard drive of this type consists of an anode transformer, a control and rectifier panel, a push-button station or other control accessory, and a d-c driving motor.

In some instances a smoothing reactor may also be required, depending upon the size and characteristics of the motor being used.

The anode transformer is used in order to make use of motors of standard voltage. By designing a special motor, it would be possible to eliminate this item entirely in most cases, but it is felt that the use of a motor of standard design has some definite advantages to the user.

The transformer is of conventional design and may be either of the insulating or of the autotransformer type. It is generally supplied as a separate item to keep to a minimum the size, weight and cost of the rectifier cabinet in which it might otherwise be located.

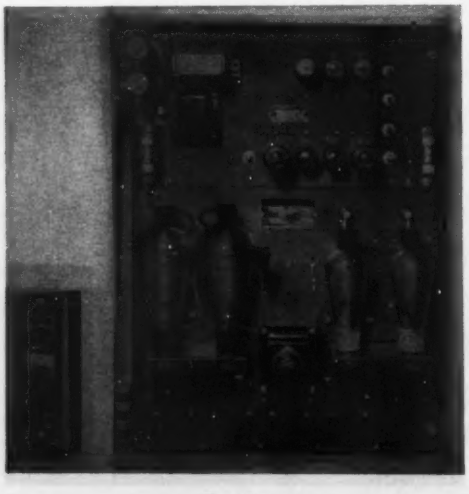


FIG. 2

Thy-mo-trol Panel (Right) and Heavy-Duty Type Push-Button Station. These Together with an Anode Transformer and a D-C Driving Mot r Comprise the Standard Thy-mo-trol Drive.

Figure 2 (right) shows a conventional type of control panel. It consists of a suitable base on which is assembled the control and power tubes, a line contactor, a thermal overload relay, a field-failure relay, a cathode-protective timer and the necessary transformers, and other material required for the electronic circuit. Suitable anode fuses are provided for protection against short circuits.

The panel is hinged in the stationary part of the enclosing cabinet and by loosening suitable screws it can be swung completely open so that the parts and wiring are readily accessible.

The control tubes and other parts associated with them are mounted on an individual sub-panel which can be removed quickly and replaced by another unit with little loss of time.

The control accessory (Fig. 2—left) is a standard heavy-duty-type push-button station in which are mounted the necessary number of momentary contact units and the speed-adjusting potentiometer. Both the speed-adjusting potentiometer and the momentary control units may be supplied as separate items which the user can mount in any convenient location.

A shunt-wound d.c. motor is used. In order to make more economical use of the rectifier tubes, 230-volt machines are ordinarily supplied.

Although the motor is of conventional design, its characteristics must be such that it will operate satisfactorily from an unfiltered rectifier supply. This is particularly true when the a.c. power supply is single-phase.

Electrical Characteristics

One of the characteristics of a good drive is that it should be capable of starting its load with a minimum of shock to the machine and under conditions which will permit the motor to commutate satisfactorily. From an engineering point of view, the accelerating scheme employed in this drive is one which does approach this ideal. It is termed constant-current limit acceleration. By means of an adjustment in the panel, it is possible to vary the accelerating current and thus the accelerating torque to a value which will bring the motor up to operating speed in the quickest time consistent with the nature of the load and the commutating ability of the motor.

From the moment the start button is pressed, the motor will assume a maximum value of current as determined by the adjustment. Under these conditions the motor will pull with smooth, uniform torque until the load is up to speed; then the current will drop off to the value needed to maintain the required torque.

For many applications, it is desirable to preset the speed at which the motor is to operate anywhere within the operating range. This type of equipment provides this feature so that the motor will be accelerated smoothly up to the speed called for by the setting of the potentiometer. The motor is always started under full-field conditions regardless of whether the potentiometer is set for operation below base speed by armature voltage control or above base speed in the field weakening range.

Protection against sustained overload is provided by means of a conventional thermal overload relay.

Quick stopping of the motor is provided by means of conventional dynamic braking. When the STOP button is pressed, the power is disconnected and a resistor is connected across the armature.

The standard equipment does not provide for regeneration or pump-back, so that when the speed-adjusting potentiometer is quickly turned from a high setting to a lower one, the motor will coast down to the new setting at a rate which will be determined largely by the friction of the load. This means that it is not suitable for use with overhauling loads.

Another factor is that when motor speed is being reduced with field applied, the motor acts as a generator and generates an excessively high voltage. In the Thy-mo-trol system, a "voltage-snubbing" circuit automatically keeps the voltage down to a safe value.

Where quick slow-down is required, a modification can be furnished which provides a form of automatic dynamic braking to slow down the motor. Except in special instances, this feature has not been found essential. A typical application where it may be necessary is in the case of a turret lathe where the operating speeds must be stepped up or down rapidly so as to synchronize with the speed of the turret and to maintain maximum production.

The speed-range obtainable with equipment of this type is largely a function of the size and type of motor employed. The range, theoretically, is something from a value approaching zero up to the maximum for which the motor is designed to operate by field weakening. The practical limits are largely determined by the heating and stability of the motor. From tests which have been made it appears that the motors can be operated over a range of up to 20 to 1 below base speed by armature control on an intermittent basis without exceeding a dangerous temperature rise, and as high by field control as the motor is designed to operate. Much, however, depends upon the nature of the load to be handled, the duty cycle, etc.

By providing closely regulated armature voltage and automatic compensation for I.R. drop, this system holds the motor speed constant within close limits, independent of load and ordinary line-voltage variations. An adjustment in the panel makes it possible to adjust the regulation to provide a drooping speed characteristic where this is desirable.

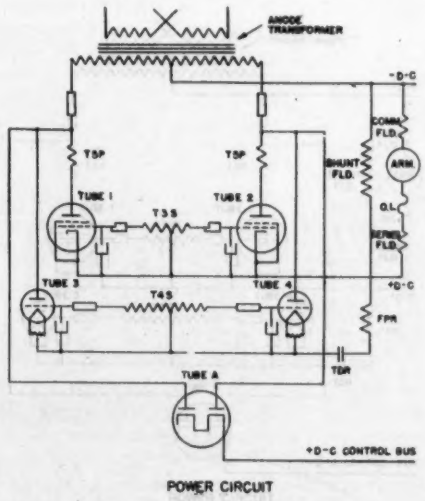


FIG. 3

Circuit Diagram Showing Thyration Rectifiers Connected to Motor.

For a given speed setting, the equipment can be adjusted to hold the regulation to a value of approximately 2% variation from no load to full load when operating below the basic motor speed. When the motor is operating in the field weakening range, the speed will decrease with load, to a value not exceeding 10% depending upon the rating of the drive.

The close regulation provided with the system makes it possible to operate the motor on a constant torque basis below base speed at any speed within the stable operating range. This means that it is possible to get a motor to operate at some low speed such as 100 r.p.m., for example, and maintain this within close limits even though the load may vary from no load to full load.

For applications where a more precise speed regulation is desired than that obtained with the standard equipments, it is possible to use the output voltage of a tachometer generator in the circuit and obtain a speed regulation on the order of plus or minus 0.5% from no load to full load. This arrangement provides exceptionally close regulation regardless of line voltage variation. Certain types of testing equipment often demand regulation of this low magnitude.

The system will operate successfully on line-voltage variations of as much as 10% of rated voltage, but to obtain maximum tube life the variation should not exceed plus or minus 5%.

For a plus or minus 5% line-voltage variation, tests have indicated that when operating over a range of from 5% of base speed up to 2 to 1 by field control, the speed will not vary more than plus or minus 1%.

One very important consideration with any electronic equipment is the question of what will happen if one or more of the tubes should fail. In this system, the circuits have been so designed that the equipment is entirely safe regardless of which tube or combination of tubes may fail. The equipment will either shut down instantly or will continue to operate, deprived of the function of the tube which fails.

All of the inductive circuits in the system which might be injured due to excessive voltage are protected by Thyrite units which keep the voltage rise down to safe limits.

Principle of Operation

The operation of the equipment can best be understood by considering individually the part which makes up the power circuit and that which constitutes the control circuit.

From the diagram shown in Fig. 3 it can be seen that a pair of tubes (Tube 1 and Tube 2) constitutes a full-wave rectifier which converts to direct current the alternating current supplied by the anode transformer. The direct current is then fed through the armature of the motor. Likewise, Tube 3 and Tube 4 make up a full-wave rectifier, which supplies direct current to the shunt field of the motor. By varying the outputs of these two rectifiers, it is possible to control the operation of the motor. Its speed can be varied from zero, by armature-voltage control, up to maximum for which the particular motor is designed to operate by field weakening.

Electronic Control Circuits

The means by which the output of the power rec-

tifiers is varied is a group of radio-type control tubes, whose basic circuit is shown in Fig. 4. Acting as amplifiers of current and voltage signals received from the motor circuit, these tubes supply the necessary direct current to the saturating winding of the saturable-core reactor in the resistance-reactance bridge which is used to vary the output voltage of the power rectifiers by the phase-shift method previously described. By varying the current in the saturating winding, the power tubes are turned on or off as required to give the desired motor performance.

To provide for the current-limit acceleration of the motor, a current transformer, T5, is used. This has two primary windings connected in the anode circuit of the two power tubes supplying current to the motor armature. The design is such that an a-c voltage is produced in the secondary, proportional to the current flowing through the thyratron tubes. The a-c voltage is rectified and connected into the circuit in such a way that when it reaches a value as determined by the setting of a potentiometer, it will have the effect of turning off the armature tubes, thus reducing the voltage on the armature and maintaining the current at a fixed maximum value.

If the control had been set to operate the motor in the field-weakening range, the current-limit control acting through a suitable tube will maintain full field until the armature current starts to reduce. Thus, during acceleration from these conditions the motor will always accelerate from zero to base speed with full field. At this point, the field will be weakened gradually until the motor reaches the preset field weakened speed. Then the armature current will drop to the value necessary to drive the load.

The adjustment of the speed is controlled by two adjustable potentiometers—one controls armature voltage, the other controls field voltage. The potentiometers are operated from a single shaft and are arranged so that approximately half of the rotation of the adjusting knob will vary the armature voltage from approximately zero to maximum. Then the other potentiometer becomes effective, and further turning will tend to reduce the field voltage so that the motor speed can be increased to the value desired, up to the maximum for which the particular motor is designed to operate by field weakening.

To maintain accurately the preset speed, it is necessary to hold armature counter-e.m.f. constant. This can be done by increasing the armature terminal voltage by an amount equal to the I.R. drop of the armature circuit. In this system, this is accomplished through the use of the same current transformer that controls the current limit. The circuit functions in such a manner that as armature current increases, the thyratrons in the armature circuit are turned on, thus increasing the armature voltage. If the load increases, the circuit operates to increase the armature voltage proportionately, which thus acts to maintain the speed at its present level. An adjustable potentiometer used in the circuit makes it possible to maintain essentially constant speed from no load to full load for any given speed setting, or to provide a drooping speed characteristic where desirable.

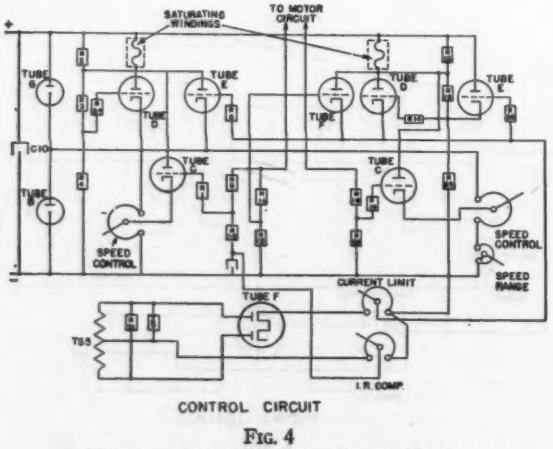


FIG. 4
Elementary Diagram Showing Control Circuit.

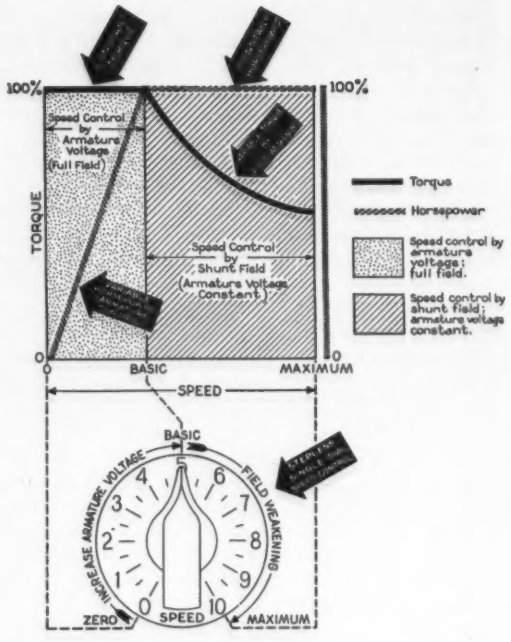


FIG. 5
Curve Showing How Motor Torque and Horsepower Characteristics Vary with Motor Speed. Coupled with Curve Is Drawing of Speed Control Dial Showing How Speed Is Controlled in the Armature and Field Ranges by a Single Dial.

When the *start* button is pressed, the motor will be accelerated rapidly and smoothly by current limit as described above until it reaches a speed corresponding to the setting of the speed-adjusting potentiometer. The motor will then maintain this speed closely, irrespective of variations in load, within the limits of the I.R.-drop-compensation feature. When the STOP button is pressed, the anode contactor will be dropped out and a resistor will be connected across the armature to bring the motor to a quick stop as full field is applied.

The substitution of a magnetic-reversing switch for the anode contactor makes it possible to reverse quickly the direction of rotation by current-limit regeneration of the motor.

Motor Operating Characteristics

When the motor is operating at speeds below basic, during which it has full-field voltage and reduced-armature voltage, it will provide constant torque. The horsepower output will decrease in proportion to the decrease in speed. When operating at speeds above basic, during which it has full-armature voltage and reduced field voltage, the motor will provide constant

horsepower and reduced torque output. This is illustrated by Fig. 5 which shows the torque and horsepower curves for the full operating range. Figure 5 also illustrates how the speed is increased by armature voltage as the speed adjusting potentiometer is turned from zero to midposition, and how the motor operates by field weakening from midposition to the point where the knob is turned to the extreme clockwise position.

Many interesting applications of the Thy-mo-trol drive have been made—most of them to machine tools because of the present limitations in size. Among the types of machines to which drives have been successfully applied are grinders, milling machines, toolroom lathes, turret lathes, and thread mills. In addition, they have been supplied for automatic welding machines and for various special equipments for testing magnetos, airplane propeller governors, and instrument tachometers. Figure 6 shows a standard Thy-mo-trol panel applied to a milling machine.

A particularly interesting explanation has been made for driving the headstock on grinders. The wide speed range obtainable and the constant torque characteristics provided at low speed make it possible to provide the right speed for every type of grind. In several instances the new control has made possible a simplification in the headstock itself through the elimination of gears and pulleys formerly required.

Another important factor in this application is that the equipment can be mounted on the grinder without fear of introducing any undesirable vibration such as might be produced with high-speed rotating apparatus. The machine can be made entirely self-contained, and it can be moved at will without worry as to the availability of a d.c. power supply.

For reversing table drives, the use of two independent speed-adjusting potentiometers makes it possible to provide full-range, independently adjustable speed for both directions of travel. A simple relay for selection between the potentiometers and a standard double-throw limit switch are all the additional material needed.

The electronic control can be supplied in a form suitable for building into a machine in the same manner as conventional control equipment. An interesting application of this type is shown in Fig. 7 (cover removed) which shows a panel of this type

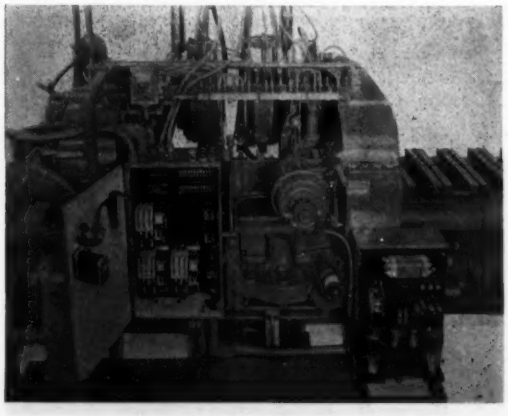


FIG. 6

Standard Thy-mo-trol Panel (Lower Right) Mounted on Machine for Milling Airplane Spars. Electronic Control on This Machine Is Used to Control the D-C Feed Motor. The A-C Magnetic Control Panel (Left Center) Controls Other Operations.

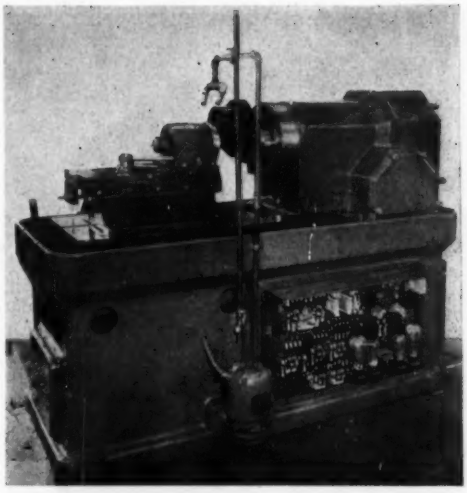


FIG. 7

Built-In Application of Thy-mo-trol to Form and Thread Milling Machines.

built into a form and thread milling machine. In this instance, the electronic equipment is combined on a single panel with standard magnetic switches used for starting the coolant pumps, etc. The features provided by the Thy-mo-trol system used on the work spindles have helped to increase production materially by increasing the amount of work that can be done between grinds, lengthening the life of the cutter, and by eliminating the necessity for changing gears and sheaves to obtain the necessary range of speed.

O. P. A. Head to Address TAPPI

The Technical Association of the Pulp and Paper Industry is pleased to announce that the principal speaker at its annual luncheon to be held on Thursday, February 18, 1943 at the Commodore Hotel, New York, N. Y., will be Prentiss M. Brown, Administrator of the Office of Price Administration, Washington, D. C.

Harry Fletcher of the Fletcher Paper Company, Alpena, Mich., will receive the TAPPI Medal. The presentation will be made by Robert B. Wolf of the Weyerhaeuser Timber Company, Longview, Wash.

At the morning session on Thursday there will be talks on Rayon by Dan B. Wicker of the American Viscose Company, Plastics by E. B. Brookbank and H. F. Lewis, and the Present and Future Status of Woodpulp by Oliver M. Porter of the U. S. Pulp Producers Association.

Paper Men Given War Appointments

Two executives of Kimberly-Clark Corporation have recently been given war appointments. Ernst Mahler, executive vice-president, is among eleven outstanding civilians appointed by the War Department to act as an advisory committee on army procurement.

W. H. Swanson, chemical engineer, has been granted a leave of absence to enable him to perform special work for the War Production Board in Washington, D. C. He has already assumed his post and expects to remain with the board for at least three months.

Delaware TAPPI Discuss Alloy

The regular February meeting of the Delaware Valley Section of TAPPI was held Friday evening, February 5, at the Engineers Club, Philadelphia, Pa., J. D. Davis, chairman, presided.

R. T. Barnes, of the International Nickel Company, gave an interesting talk "Role of Modern Material in Paper Making Machinery." Mr. Barnes covered the use of Monel and stainless steel, as has been done in the pulp and paper industry over the past few years, the applications being suction boxes, jordan fillings, filter wires and covered drying cylinders. As has been previously shown, the life of these materials is appreciably longer than for the usual steels used. An example of the life of jordan fillings was given: a life of 5 months being obtained with steel as compared to 6 years with Monel, and the latter is still in use.

A number of new alloys have been developed, although not much information can be given concerning them. It was mentioned that "Z" Nickel has been developed that could be used for shaker springs on a Fourdrinier. Large valves are now being fabricated from plate alloy resulting in a definite savings in wt. A Monel has been developed that can be successfully heat-treated, and could be used for making screen plates, and after cutting the slots could be heat-treated to get a very long life. Other materials in the development stage have increased resistance to corrosion, and it is felt that materials will be available that will retain their corrosion resistance at any temperature.

Mention was made that in a number of cases, such as bronzes, alloys containing non-strategic materials could be used with fairly good results. Each specific case requires a study as to the best substitute available.

Plating of calender rolls frequently is of benefit to obtain usable rolls. Some priority would be required, but it would probably not need to be the highest.

Those present at the meeting included: Roger W. Beales, A. L. M. Bixle, Alan R. Boyd, C. M. Connor, J. D. Davis, D. S. Dieffenderfer, J. C. Dieffenderfer, J. F. Good, Lois Hans, Harry Hulmes, W. H. Lapp, R. E. McGrath, Alex. McInnes, H. C. Merrill, W. B. Morehouse, A. H. Nadelmann, E. Progoff, Lt. (jg) Robert J. Proctor, John F. Reardon, C. W. Rivise, Wm. Schlotterbeck, Edward A. Shallcross, Charles A. Shubert, George M. Suydam, Richard N. Semple, R. H. Underdown, A. E. Waugh, and A. H. Webber.

WPB Issues Technical Bulletin

A first special bulletin dealing with projects of wide application in the paper industry, has been issued under the title of "Special Technical Bulletin No. 1, Impervious Papers in the War." The issuing department is The War Products Development Section, Pulp and Paper Division, WPB, Old Fisheries Building, Room 12, Washington, D. C.

This bulletin is a progress report dealing with Project No. 13, with the stated purpose "To investigate the status of, need for, and application of impervious papers in the war program."

Project 13 is assigned to Russell H. Savage of the War Products Development Section. The study was undertaken because many organizations within the industry have devoted, and are continuing to devote, considerable time and energy to the development of "impervious papers." It seemed necessary, therefore, to determine whether there is an urgent demand and use for such papers in connection with the war program. If there is a real demand for impervious papers and such papers are available, then the industry has fulfilled part of its obligation; however, if there is a real demand and the proper types of impervious papers are not available, then it is felt that the pulp and paper industry probably can and should make a further contribution to this field.

The bulletin states that the War Production Board, Army, Navy, Department of Agriculture, Office of Strategic Service and the Office of Defense, Health and Welfare Services have been approached to determine if there is a need for an impervious paper which is not available at the present time.

The bulletin states that the development of impervious papers for packaging dehydrated foods, seems to be one of the more significant. This involves the development of impervious papers equal or better than laminated lead foil. Important characteristics are: Flexibility, good sealing properties, retention of physical characteristics at temperatures as varied as 20 degrees below zero and 135 degrees F.

Empire State Discusses Plastics

The Eastern New York Regional Group of the Empire State Section of the Technical Association of the Pulp and Paper Industry met at the Queensbury Hotel, Glens Falls, N. Y., on February 4th. Frank McCourt of the International Paper Company presided.

The principal speakers were George Fromm of the American Cyanamid and Chemical Company and H. E. Morse of the General Electric Company. Mr. Fromm reported on the use of synthetic resins for coating and treating paper and Mr. Morse described the use of plastics in equipment. A motion picture "The Magic of Modern Plastics" was shown.

Those present included: Wm. A. Barr, W. E. Beazley, W. R. Blood, Burton K. Clifford, A. B. Copping, Foster P. Doane, Jr., M. R. Driscoll, R. M. Drummond, R. S. Duell, Vance P. Edwardes, Henry W. Fales, P. H. Farry, S. L. Foster, George E. Fromm, T. A. Gastonguay, Michael B. Gormley, F. B. Halloran, A. G. Hatcher, J. H. House, J. W. Joslyn, Frank A. Juckett, Louie Kilmer, Leon Larson, W. M. Leeson, D. C. Lincoln, Allen Lowe, P. Fay Marrs, F. J. McCourt, H. B. McGee, C. J. McIntire, O. J. Mills, W. D. Mooney, Herbert G. Morse, E. G. Mullen, Wm. M. Murphy, Harry Newell, G. H. Pountain, A. Prestera, Thomas N. Rider, Wallace L. Scott, L. R. Sherman, C. V. Simmons, Eric R. Smith, K. A. Taylor, Lawrence Thompson, M. G. Tibbetts, E. J. Trimbey, A. E. Vanwirt, Howard E. West, R. H. Wiles, G. S. Witham, R. I. Wynne-Roberts, and C. E. Youngchild.

Oregon Paper Co. Reelects Officers

SALEM, Ore., February 12, 1943—At the annual meeting of the stockholders of the Oregon Pulp and Paper Company, incumbent directors and officials were re-elected. President Leadbetter reported that production for 1942 exceeded that of 1941. Net profits were considerably less because of increased income and war taxes. It is becoming increasingly difficult to secure necessary supplies and materials or transportation, except on government orders.

Pulp Board or Pulp?

Customs officials are conducting an investigation into the uses of certain material imported from Canada which may be either pulp board in rolls or pulp. The question has gone before the Bureau of Customs at Washington, and information as to the use of such material has been requested from the Import Committee. Interested mills are being circularized by the Import Committee in an effort to determine the proper classification of such material. The specific issue arose in the case of a shipment of rolls of 14-point material which was unsized. Some Customs officials believe that the fact that the material is not sized entitles it to admission duty free as pulp, while other officials believe that the sizing is not the proper basis for differentiation. The Import Committee is asking interested mills to state whether such material was known as pulp or as pulp board at the time of the passage of the Tariff Act of 1930. If known as pulp board the Customs officials are anxious to know by what name the product was customarily known at that time. The Import Committee has always taken the position that it had no concern with the importation of pulp, a duty free commodity, but has also taken the position that it should protect domestic paper and board manufacturers against the duty free importation as pulp of material to be used as either paper or paper board.

WPB Requests Figures on Casein

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 10, 1943—Detailed figures on the production and distribution of casein were requested from the industry today by the Plastics and Synthetic Rubber Section, Chemicals Division, War Production Board.

In a statement issued to all distributors and consumers of casein the Section pointed out that such information is necessary because of recent reductions in the potential supply of milk available for casein in 1943 and the continued shortage of shipping space from South America.

All distributors and consumers of casein are asked to report their stocks on hand at the close of 1942. Consumers of casein must report the quantities of casein consumed for each year indicated on the form and for each type of product listed. Consumption of casein for the manufacture of any type of product not listed must be shown by writing in the type of product on the form.

Members of the industry were urged to furnish this information as soon as possible.

Paper Exporters One Year Old

The problems confronted by paper exporters in adapting themselves to this nation's war economy program have firmly established the necessity for association activities such as have been afforded by the United States Paper Exporters Council, Inc., it was stated by its president, Elwin Walker of Walker, Goulard, Plehn Company, Inc., in announcing the completion of the first year of existence of this association of leading members of the paper export trade.

The council according to Mr. Walker has pursued a program of cooperation "with the Federal government in facilitating the export of paper and paper products at reasonable prices in such amount as will be of maximum benefit and service to foreign buyers friendly to our country and at the same time fair to domestic military and civilian requirements."

In summarizing the council's activities during the past year, Mr. Walker stated that conferences with officials of the Office of Price Administration and the Board of Economic Warfare have provided a better mutual understanding and clarification of the paper exporters' problems as affected by necessary government controls. At the invitation of the council, government officials have cooperated in addressing some of the semi-monthly luncheon meetings of the members. The essentiality of paper and its importance in maintaining the essential domestic economy of friendly overseas nations was the subject of a memorandum recently submitted by the Council to the Board of Economic Warfare in furtherance of its efforts to cooperate fully with government agencies.

In addition to Mr. Walker, its president, the other officers who have guided the council successfully through its first year are: Vice-President, Eli de-Vries, of Parsons & Whittemore, Inc., and Secretary-Treasurer, Frank W. Smith, of National Paper and Type Company. The Council's legal advisers are Javits & Javits, attorneys of New York City and Washington, D. C.

NEWSPRINT CUT CONSIDERED

(Continued from page 7)

fice of Civilian Supply that "surplus" manpower existed in the paper manufacturing industry and employees soon would be included in the list of occupations which were not draft deferable. This, it was said, resulted in "an exodus of the current limited number of workers in paper production." However, Representative Bradley reported, the OCS later in the day changed its stand in this regard.

Cut May Be Under 15 Per Cent

Although reports in Washington varied as to the extent of the impending reduction in the use of newsprint from 15 to 50%, W. G. Chandler, head of the WPB Printing and Publishing Division, said it would not be as great as 15%. Officials said the curtailments were necessary to make available for more essential uses some of the power and labor used to produce the paper.

The Office of Civilian Supply, of which Joseph Weiner is director, is understood to have estimated the minimum labor requirements of pulp and paper mills at 67% of their employment for November, 1942.

The "bed rock" employment needs of newspapers and periodicals were estimated by Mr. Weiner's office at 56% of November, 1942, levels; of books and job printing, 38%; of lithographing, 81%, and of book binding, 37%.

As compared with a total force of 202,000 salaried persons and wage earners in the newspaper and periodical publishing industries, the estimate fixed a minimum of 115,000 persons. This was broken down into 50,000 salaried workers, as compared with 85,000 last November, and 65,000 wage earners, as compared with 117,000 last November.

New York Paper and Pulp Market Review

Paper Continues in Active Demand With Orders Gaining as Labor and Delivery Problems Increase—Prime Grades of Bleached Pulp Are Strong—Supply of Roofing Rags Reported More Limited.

Office of the PAPER TRADE JOURNAL.
Wednesday, February 10, 1943.

Orders for paper continue to be reported active, with the general demand at a high level. A substantial part of the current demand is attributed to the essential nature of paper and concern of consumers that necessary supplies may not be obtainable in the future, as manpower and delivery difficulties appear likely to curtail the volume of civilian trade. Manpower and delivery problems are reflected in reports received from many manufacturers' representatives, jobbers, and general paper merchants this week.

The index of general business activity for the week ended January 30 rose to 134.4, from 133.3 for the previous week, compared with 139.9 for the corresponding week last year. The index of paper board production was 138.5, compared with 142.6 for the previous week, and with 169.3 for the week ended January 31, 1942.

Paper production for the week ended January 30 was estimated at 87.2%, compared with 104.3% for 1942, with 85.8% for 1941, with 89.2% for 1940, and with 80.7% for the corresponding week for 1939.

Paper board production for the week ended January 30 was 88.0%, compared with 101.0% for 1942, with 79.0% for 1941, with 72.0% for 1940, and with 66.0% for the corresponding week for 1939.

A further curtailment in the use of newsprint paper has been confirmed by the WPB. Assurances are given that no further cuts will be made until March 31, and may not be issued until a later date. Current reports from Washington indicate that the second reduction in the use of newsprint, based on the manpower and electric power supply situation, will probably not be more than 15% and may be somewhat under that figure.

The over-all U. S. production of paper for 1942 is estimated at 16,522,000 tons, against a capacity of 18,350,000 tons. This compares with the 1941 production of 17,304,143 tons and a capacity of 18,000,000 tons. This is a decline of 4.5% from the all-time high mark of 1941. The operating ratio for 1942 averaged 90%, compared with 97% for 1941.

Wood Pulp

Prime grades of chemical wood pulp are in active demand. Total U. S. production for 1942 set up a new high record of approximately 10,200,000 tons, or about 2% higher than the output in 1941.

Rags

Mill buying of cotton cuttings is reported improved this week. Major interest is in the high and medium grades. Prices are more firm.

Steadily declining supplies of old cotton rags is causing concern in this market. Felt mills are purchasing rags freely and ceiling prices are maintained.

Old Rope and Bagging

Mill buying of old Manila rope continues steady. The OPA ceiling prices on sisal are reported in some quarters as unfavorable to dealers.

Trading in scrap bagging continues light, with the supply situation reported tight.

Old Waste Paper

Collections of waste paper are well under normal and reported due to unfavorable weather and labor scarcity. Mill demand is fair, with major interest in the higher grades. Mixed paper and news are less active.

Twine

No important change in the twine market has been reported this week. Government requirements are reported continuing heavy, with restrictions continuing to limit the purchase of some grades to the most essential civilian uses.

Chemical Solutions

D. Van Nostrand Company has recently published an interesting book entitled "Chemical Solutions" (400 pages) by Frank Welcher, Assistant Prof. of Chemistry at Indiana University. This book gathers in one place for convenient reference the methods of preparing solutions most frequently required by the chemist. In addition to a description of the preparative methods this volume includes the use of each solution, the procedure for its use, a list of substances that interfere in making special tests, the sensitiveness of the test reagents and general remarks regarding storage, keeping qualities, etc. The solutions are listed in alphabetical order under the name by which they are best known. An index is included in which the reagents are classified according to their uses. This is done to assist the chemist in locating solutions whose functions are known but are not listed by the name known to him. The units of concentration are expressed as molarity, normality and as mg. of anion or cation per ml. of solution.

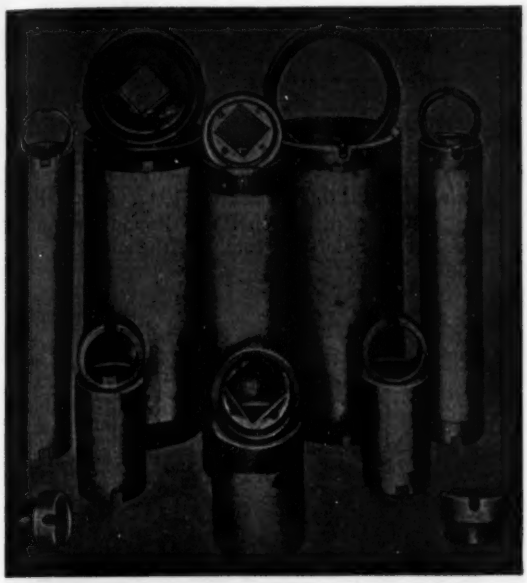
Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York, N. Y., for $4.75 per copy.

France Conserves Waste Paper

France is increasingly conserving waste paper because of the cessation of wood pulp imports from Sweden and Finland, according to the Department of Commerce.

Conservation of forest land is a secondary consideration inducing use of waste paper. Manufacture of a ton of newsprint in France requires one and one-half tons of wood which is the annual normal production of about two and one-half acres of forests.

About 475 tons of rags were turned in during a recent collection period. Clothes, household linens and funishings and wool in various forms were collected to augment the meager raw material supplies available to the textile industry.



ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with re enforced square hole. This patented feature of reenforcement gives added strength and durability

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.

CORINTH, N. Y.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL
Wednesday, February 10, 1943.

BLANC FIXE—Prices on blanc fixe are firm and unchanged and conform to prevailing market levels. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton, f.o.b., works. Demand reported good for the week.

BLEACHING POWDER — Quotations on bleaching powder are firm. Demand reported heavy for the week. Bleaching powder is currently quoted at $2.50 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are unchanged for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at 19 cents per pound; 80-100 mesh, at 19½ cents per pound. All prices in bags, car lots. Argentina casein, 20-30 mesh, at 9 cents per pound, c.i.f., is nominal. No quotations on French casein.

CAUSTIC SODA—Quotations on caustic soda continue unchanged at prevailing market prices. Demand reported improved. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds in drums, car lots, at works.

CHINA CLAY—Prices on china clay are firm and conform to prevailing market levels. Demand reported moderate at this date. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay from $12 to $22 per ton, at mines. Imported clay is currently offered at from $13 to $25 per ton, ship side.

CHLORINE—Quotations on chlorine are firm and unchanged. Market strong. Government demand is reported heavy during the current week. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm for the week with lower prices on some grades. "G" gum rosin is currently quoted at $3.40 per 100 pounds, in barrels. Savannah "F" wood rosin is currently quoted at $3.35 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is quoted at $3.62 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand moderate for the current week. Domestic salt cake is currently quoted at $15 per ton, in bulk; chrome salt cake at $16 per ton. Restrictions on chrome cake removed. All prices in car lots, f.o.b., shipping point. The quotation of $16 per ton on imported salt cake is nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market levels. Demand reported active for the week. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH — Prices on corn starch are reported unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, carlot, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported light for the current week. The commercial grades are currently quoted at from $1.15 to $1.25; iron free at from $1.75 to $1.85 per 100 pounds. All prices in bags, carlots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and conform to prevailing market levels. Annual contracts are currently quoted at 16 per long ton, f.o.b., mines. Spot and nearby carlots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mines. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	$5.00	@	—
No. 1 Wrapping	4.75	"	—
Standard Wrapping	4.50	"	—
Standard Bag	4.125	"	—
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.05	"	—
White No. 1½	1.00	"	—
White No. 2	1.00	"	—
Anti-Tarnish M. G.	.95	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.35	"	—
Bleached, Jr.	2.65	"	—
Manila—per cwt.—C. l. f. s.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50
Boards, per ton—			
News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Lt. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*60.00	"	—
Binders Boards	84.00	"	116.00

*OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers
100% Rag Ext. No. 1	$39.10 @ $46.00		$40.25 @ $47.25
100% Rag	32.20 " 37.75		33.35 " 39.25
95% Rag	.... "		29.90 " 35.00
75% Rag	23.00 " 27.00		24.15 " 28.25
65% Rag	.... "		22.80 " 27.75
50% Rag	18.70 " 22.75		19.90 " 24.25
25% Rag	16.40 " 20.00		17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55 @ $12.75	$11.70 @ $14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper

Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@ $13.80
No. 2 Glossy Coated	12.40	" 14.00
No. 3 Glossy Coated	11.60	" 13.20
No. 4 Glossy Coated	11.15	" 12.70
No. 1 Antique (watermarked)	10.25	" 11.70
No. 2 Offset	9.60	" 11.00
A Grade E. F.	9.35	" 10.75
A Grade S. & S. C.	9.60	" 11.00
B Grade E. F.	8.85	" 10.25
B Grade S. & S. C.	9.10	" 10.50
C Grade E. F.	8.55	" 9.75
C Grade S. & S. C.	8.80	" 10.00
D Grade E. F.	8.25	" 9.50
D Grade S. & S. C.	8.50	" 9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00	
Unbl. Softwood Sulphite	64.00	@ 66.00
Bl. Hardwood Sulphite	73.50	
Unbl. Hardwood Sulphite	63.50	
Bl. Mitscherlich	81.00	
Unbl. Mitscherlich	72.00	
N. Bleached Sulphate	86.00	
S. Bleached Sulphate	79.00	
N. Semi-Bleached Sulphate	82.00	
S. Semi-Bleached Sulphate	75.00	
N. Unbl. Sulphate	73.00	
S. Unbl. Sulphate	63.50	
Bl. Soda	66.00	
Unbl. Soda	62.00	
Groundwood	46.00	

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

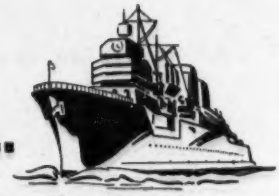
Should freight charges actually exceed these allowances, the difference may be added to the maximum price.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—		
New White, No. 1	6.50	@ 6.75
Silesias No. 1	4.50	" 4.75
New Unbleached	6.50	" 6.75
Blue Overall	5.00	" 5.25
Fancy	3.50	" 3.75
Washables	2.75	" 3.00
Mixed Khaki Cuttings	2.75	" 3.00
O. D. Khaki Cuttings	3.25	" 3.50



WORKING...
with the
ARMY *and* NAVY

The War Production Board has asked that we devote our entire productive capacity to products essential to the winning of the war. We have responded willingly.

We regret that this may interfere with the needs of the paper industry with whom we have worked consistently for over 60 years.

We will continue to furnish replacement and repair parts for our equipment where priorities can be furnished which will meet with the approval of the War Production Board.

If we can advise you relative to your production problems, do not hesitate to call on us at any time.

When war clouds are lifted we will be with you again in the development of a larger and better paper industry for all of us.

HUDSON-SHARP
MACHINE CO • GREEN BAY • WIS

★ ★

More than just a
TRADE MARK

EXCELSIOR Knox Woolen Co. Camden, Me. FELTS & JACKETS

BUT also a guarantee by men who for 78 years have prided themselves in making finer felts. TO YOU —this is the mark of dependability, longer felt life and greater saving.

KNOX WOOLEN CO.
CAMDEN, MAINE.

West Virginia Pulp and Paper Company

230 Park Ave. New York
35 East Wacker Drive Chicago
Public Ledger Building Philadelphia, Pa.
503 Market St. San Francisco, Cal.

Manufacturers of
ENGLISH FINISH SUPERCALENDERED MACHINE FINISHED BOOK and LITHOGRAPHIC PAPERS

Offset, Envelope, Bond, Writing, Mimeograph, Ledger, Eggshell, Cover and Music Papers, Index Bristol, Post Card and Label Papers

HIGH GRADE COATED BOOK

• • • •

KRAFT WRAPPING AND KRAFT ENVELOPE
KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

MILLS:
Mechanicville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Cass, West Virginia
Charleston, South Carolina

PRICE & PIERCE »»»»»»»»» ltd •

Wood Pulp & Paper Agents

60 East 42 Street New York, N. Y.

Old Rags

White, No. 1—			
Repacked	*1.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

OPA Maximum Prices.

Foreign Rags

All prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.00	@	4.25
Wool Tares, light	4.25	"	4.50
Wool Tares heavy	4.50	"	4.75
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	4.25	"	4.75
Sisal Strings	*3.00	"	4.00
Mixed Strings	1.10	"	1.20

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.57½	"	—
Mixed Books	.85	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old Kraft Corrugated Containers	1.50	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	.85	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1	.07¼	@	.07½
New White No. 2	.04½	"	.05
Light Silesias	.04½	"	.04¾
Silesias, No. 1	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached	.07¼	"	.07½
Washable Prints	.03¾	"	.03½
Washable No. 1	.02	"	.02¼
Blue Overall	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales	.03¼	"	.03½
New Black Soft	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.	.03	"	.03¼
No. 2 Mixed	.02¼	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas	.04¾	"	.05¼
New Black Mixed	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope	3.75	"	—
Mixed Rope	.75	"	1.90
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Overissue News	.85	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old Corrugated Containers	1.00	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	3.75	@	—
Sisal Rope No. 1	4.00	"	—
Sisal Rope No. 2	3.00	"	—
Mixed Rope	1.35	"	1.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.75	"	5.25
Jute Carpet Threads	3.25	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.25	"	3.75
Wool Tares—			
Foreign	(nominal)		
Domestic	3.75	"	4.00
Aust. Wool Pouches	5.25	"	—
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.60
Paper Mill Bagging	2.75	"	3.00
No. 2 Bagging	1.35	"	—

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼	"	.05
New White No. 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06¼
Underwear Cutters, Bleached	.06¼	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¼
New Black Silesias	.03	"	.03¼
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¼	"	.03½
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.06¼	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
Old Manila Rope	5.75	"	—

* OPA Maximum Prices

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Heavy Books & Magazines	1.67½	"	—
White Blank News	1.65		
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—